# GAS

MAY 1958

GAS for GOTHAM

A CHILTON PUBLICATION

THE NATION'S NATURAL GAS AUTHORITY

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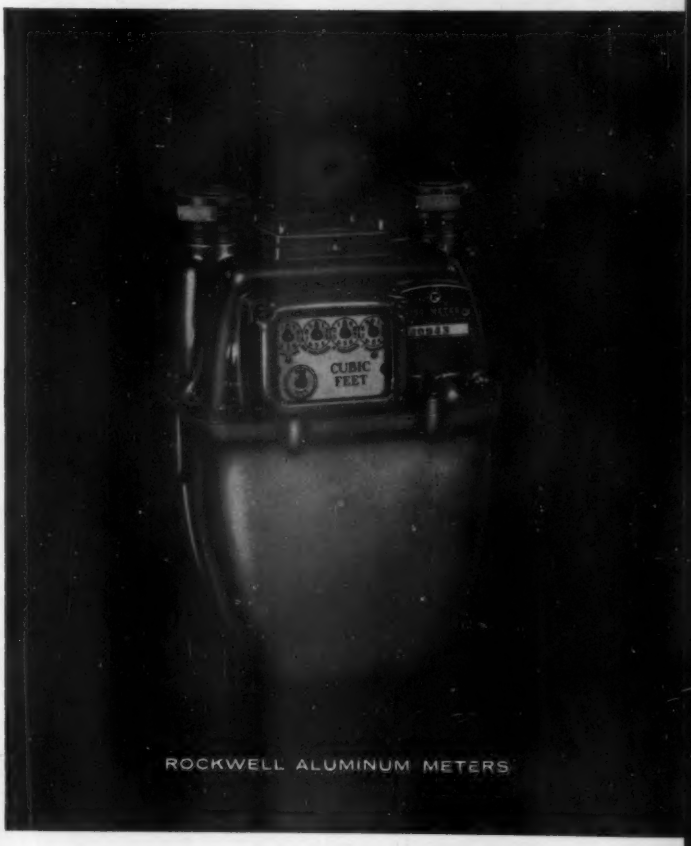


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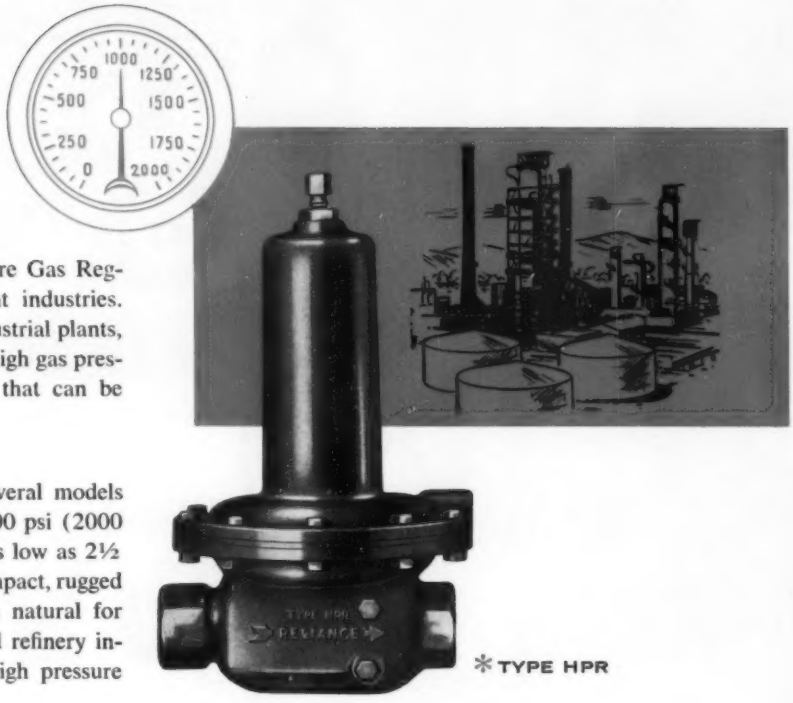


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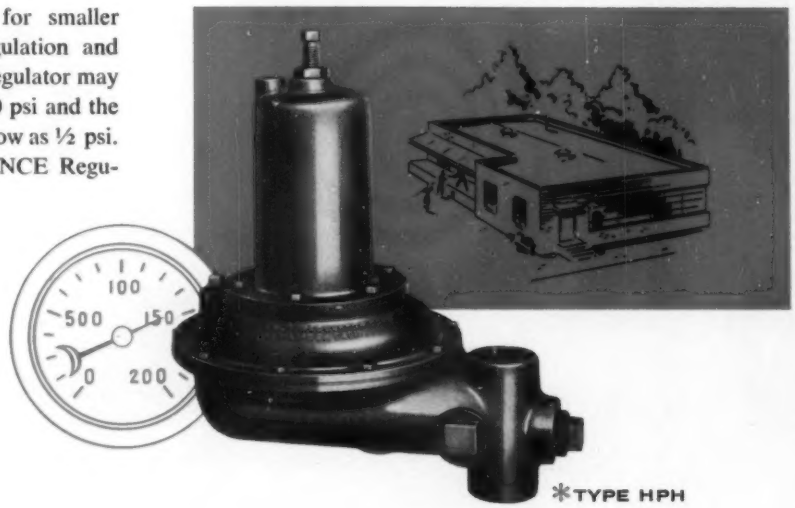


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GAS

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May 1958

34TH YEAR OF PUBLICATION

VOLUME THIRTY-FOUR • NUMBER 5

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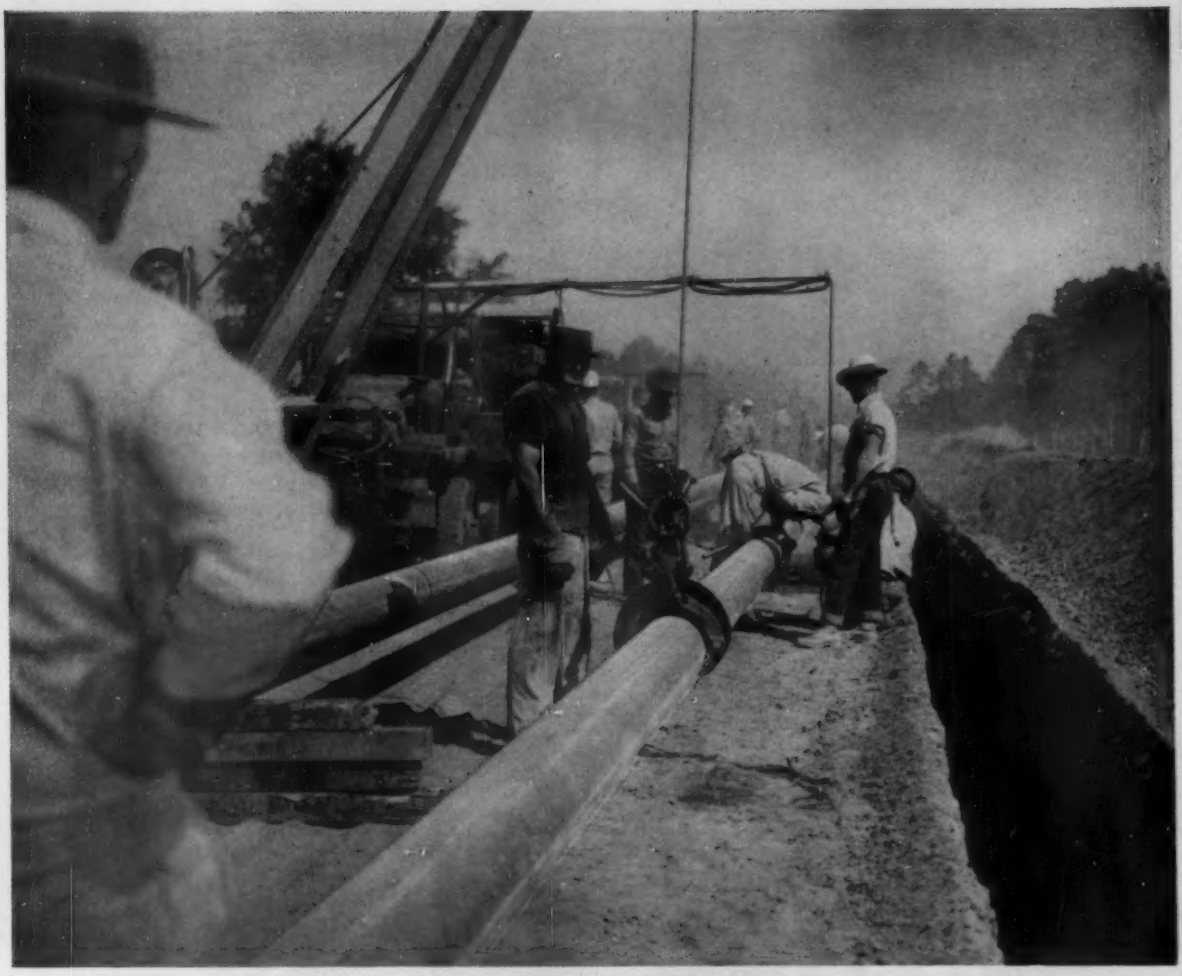

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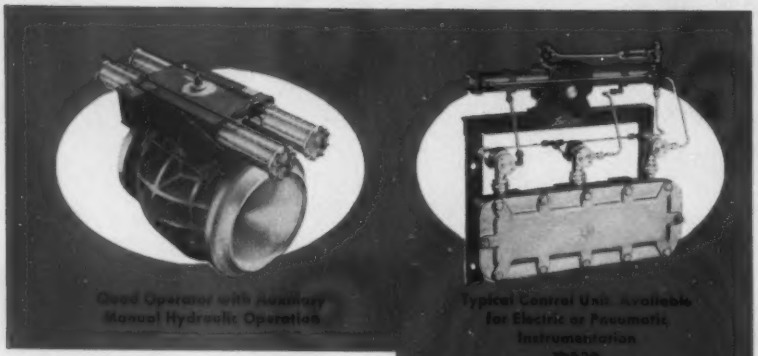

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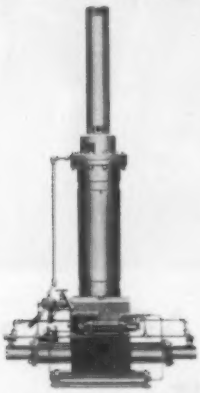

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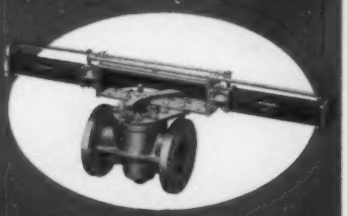

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# Thermally Thinking

THIS is the year of a Golden Anniversary for the Southern Gas Association, headquartered down there in Dallas. It is a strong organization that has served members in Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, New Mexico, North Carolina, Oklahoma, South Carolina, Tennessee, Texas and Virginia very well. It has made its contributions to the North American gas industry.

Traveling about the U. S., Canada, and possibly South America (how about it, Howard and Ray?) as we do, we are constantly amazed at the number of men from the SGA states we find in key positions in the gas companies. And there is little need to point out the many well managed and operated gas companies that inhabit and are headquartered in the states served by SGA.

One of SGA's better efforts is its program of roundtable discussions. We have heard many, many favorable appraisals of these working group meetings.

We have never attended one of SGA's roundtables as it seems that horsethieves, carpetbaggers and editors are, in true Southern fashion, not exactly welcomed—in fact, they are excluded. They seem to be getting along pretty well without representation from the gas industry trade press, so we will be completely altruistic about the situation and sincerely wish them continued success with their roundtables as well as with all association business.

A fair share of the credit for Southern Gas' development and service to the gas industry should go to its smiling (usually), able managing director, Bob Suttle. I doubt that he has gone the full 50-year route. But he has done a good job. So, we at GAS give him our best wishes for the next 50 years.

I particularly respect Bob because he once sent me a dapper Nieman-Marcus tie for performing some rather easy—actually nebulous—task during an SGA meeting. I think I loaded and unloaded shuttle busses or something. Never have I had so much tie for so little effort.

Happy Anniversary to all of the Southern Gassers.

Apparently all is not well with atomic energy. That statement applies, at least, to the business-owned nuclear power plants. The mass-destruction side of nuclear energy does seem to be doing well, thank you.

But back to industrial nuclear power plants. Utilities are quickly getting rid of that starry-eyed look when atomic power is mentioned. It seems costs of nuclear plants are soaring and profit prospects are vanishing. As any good gasman knows, nothing causes a utility to lose interest in a project any quicker than these factors.

This serious reappraisal of nuclear-powered generating stations by private industry causes us sobering concern. As an old gasman, I have never been a loudly aggressive amen-corner type of backer of electric power from any sources. I simply tolerate the electric light and let it go at that. I highly prefer to get the service from a business-owned power company. The zest lost by such companies for nuclear power plants is, then, a real shot in the arm to the public power boys.

This makes the AEC as nervous as Ernie Ford's longtailed cat in a room full of rockers. They have backed private ownership. Now, they fear we might lose world leadership in this field, so they are taking a neutral path. But, it is evident that public power advocates and even Federal ownership backers are making real progress. Just another political matter for the gas industry to keep its eyes on and make its voice known in. None of us can or wants to hold back progress; however, it is debatable if public or Federal ownership is really progress, or efficiently produces same.

J. Fred Ebstan
EDITOR

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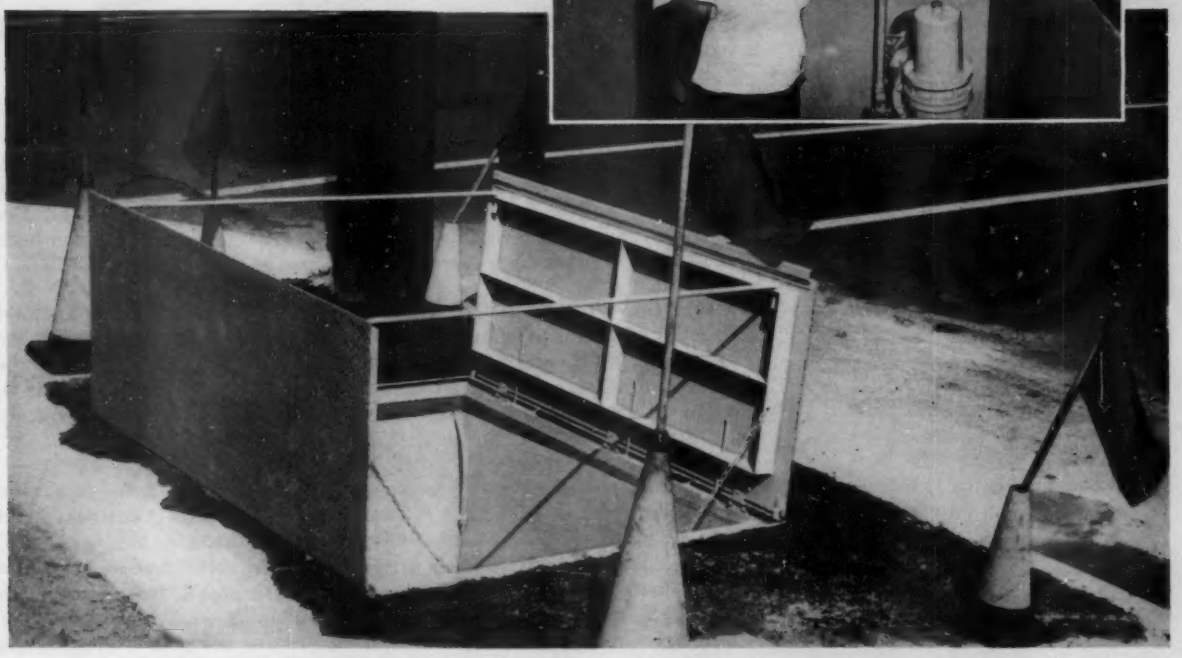

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# GAS HIGHLIGHTS

**Transwestern files**

Transwestern Pipeline Co. (Houston) has filed for FPC certification to build a 1305-mile line to transport gas from west Texas and the Panhandle to the California-Arizona border. Initially, the $193 million project is scheduled to deliver 350 MMcf/day to Pacific Lighting Gas Supply Co. PLGS, in turn, will deliver the gas to Southern California and Southern Counties Gas Companies. Transwestern hopes to deliver by mid-1959.

**More gas for midwest**

Natural Gas Pipeline Co. of America seeks FPC certification to build 232 miles of 36-in. pipeline between Beatrice, Neb., and Joliet, Ill., plus 258 miles of 36-in. and 21 miles of 26-in. line from the Texas Panhandle to Beatrice. Delivery capacity—185 MMcf/day. They want to get it in by Jan. 1, 1959. Confident they can do so if they obtain FTC certificate to construct the $87 million facilities by no later than May 1.

**Liquefied natural gas again**

Looks like liquefied natural gas—long in discussion and test—may soon get off the ground. CONSTOCK Liquid Methane Corp. (Continental Oil Co. and The Union Stock Yard & Transit Co. of Chicago) filed with FPC for a disclaimer of jurisdiction or, alternately, a certificate to build and operate facilities to move natural gas, in liquid phase, from East Moss Lake (Louisiana) field to Great Britain. Plan is experimental and of temporary duration. An experimental waterborne barge will provide the transportation tankage.

If successful, the project may prove the feasibility and economy of storage, transportation and handling of liquefied hydrocarbons. Could mean a lot to Great Britain's future fuel supply. Also, gasmen in the U. S. will watch it closely—should the need arise, it might mean that natural gas in liquid form could be brought to the U. S. from distant and remote supply areas of the world.

**Expansion ahead**

There's expanding to be done in the gas industry and lots of it, according to AGA's Chet Stackpole. He says that by the end of 1970 our industry will serve an average of 43.7 million customers—up from 30.4 million in '57. To do this job, the industry will spend $36 billion for gas construction. The bulk is $11.5 billion for distribution, and $14 billion for pipelines.

**Gas production**

With oil production way down, there is a reactive decrease in casinghead gas production. Oil is ill.

**Living with Memphis**

Both Texas Illinois and Natural Gas Pipeline Co. of America have negotiated agreements with their respective customers on their current level of rates. NGPL will experience $1.8 million in additional revenue from 12 of its involved customers; TI came up with $2.4 million additional after working it out with 7 affected customers. Proves that it can be done.

**Gas vs. electricity**

A battle is on before California's PUC. It rages over an established $55 revenue deficiency adjustment in the case where a large builder elects to install other than gas appliances for cooking or water heating. The basic foundation of this rule is the money the gas company can invest to serve a new customer, without burdening other customers, depends on the number and type of gas appliances to be installed by such new customer. Counsel for SoCal & SoCounties told the PUC that Southern California Edison Co. is attacking the gas companies' main and service extension rules, which have been in effect for years, as a subterfuge to improve the competitive position of electricity at the expense of gas customers.

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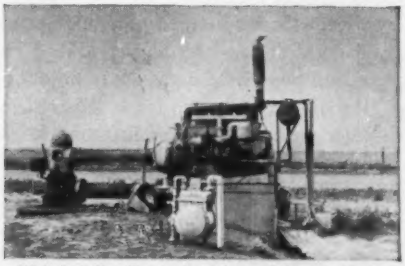

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# Regulatory and Legislative Trends

A COMMENTARY ON NATIONAL AND STATE DEVELOPMENTS BY AN EXPERT IN UTILITY LAW

## FPC must fix price for gas sold at the Christmas tree

RECENTLY the United States Supreme Court declined to review a Federal Court decision that requires FPC to regulate the price charged by an independent producer for sales of gas at the wellhead to interstate pipeline companies. This is the final retreat of gas producers since the battle started in the 1954 decision of the Supreme Court in the Phillips Petroleum Co. case. There the Supreme Court ruled that FPC was obligated to regulate the price for gas sold at the outlet of processing plants to interstate pipelines, after production and gathering ended. With reference to the intent of Congress, the Supreme Court declared in the Phillips case that:

"* * * We believe that the legislative history indicates a congressional intent to give the commission jurisdiction over the rates of all wholesales of natural gas in interstate commerce, whether by a pipeline company or not and whether occurring before, during, or after transmission by an interstate pipeline company."

Until this recent court decision involving Saturn Oil & Gas Co. it was debatable whether FPC had authority to fix the price of gas sold at the wellhead. Now all gas sales by producers that are made in interstate commerce for resale are subject to FPC rate regulation. The producers have good reason to be sad.

**• Saturn's gas operations**

Saturn is a small, unintegrated oil company which owns and operates natural gas properties only in the state of Kansas. Saturn's production is from 45 wells, 40 of which were the subject of this proceeding. All of these wells are located in the Hugoton field in Kansas. In these wells Saturn has varying interests. The gas is sold under long-term contracts to Panhandle Eastern Pipe Line Co. and to Northern Natural Gas Co. Saturn has no affiliation or connection with either of these companies. Saturn never has served any community or any mainline industrial consumer at wholesale or retail. It never has held itself out as being willing to serve the public generally.

The gas sales by Saturn are unusual in that the product is a very dry gas requiring neither processing nor dehydration to make it ready for transportation and consumption and in that the sales are at the wellhead.

Concerning Saturn's sales of gas at the Christmas tree the FPC trial examiner's report states:

"Saturn owns no facilities beyond its 'Christmas tree' at each well, with the exception, in some instances, of a few inches of pipe between the 'Christmas tree' and the meter of the purchasing company. In the other instances the meters are attached to the 'Christmas tree.' All meters are owned by the purchasers. As a part of Saturn's 'Christmas trees' at these wells there is a valve by means of which the flow of gas from the well and into the purchaser's meter may be controlled. These valves are operated by the purchasers of the gas. Saturn owns no pipelines, no processing or manufacturing plants, and no other type of natural gas facilities than those used in the production of its gas and the delivery thereof at the wellhead to Panhandle and Northern."

Panhandle and Northern are interstate natural gas pipeline companies, and Saturn sells gas in interstate commerce to them for resale for ultimate public use.

An integrated oil company is one engaged in all phases of the petroleum industry from exploration to refining and retailing of oil products including gasoline. Saturn contended that the Phillips decision of the Supreme Court involved a large integrated oil company and that it should not be controlling because Saturn is a small unintegrated company. The Federal Court said that the asserted distinction was not convincing. The court added that there is nothing in the Natural Gas Act which makes its applicability depend on the size or the degree of integration of a natural gas operator. The court concluded that the act applies to all sales of gas in interstate commerce for resale.

**• Minimum field prices and state conservation**

Saturn urged that the extension of FPC jurisdiction to wellhead sales destroys the power of the states to exercise their constitutional power over the conservation of natural resources. That state power has been used to regulate the production and gathering of natural gas. Saturn pointed out that Kansas fixed a minimum wellhead price for gas produced from the Hugoton field where Saturn operates. A minimum field price is an effective conservation control measure, but there cannot be dual control of wellhead prices by states and FPC. The Federal Court reasoned that the state has the power to regulate the physical activities of producing and gathering natural gas, but not Saturn's sale price. For example, states regulate the drilling and spacing of wells plus proration, but FPC has the sole authority to regulate the sale of gas in interstate commerce at wholesale.

Here the Federal Court was prophetic in its decision, because two

months later the United States Supreme Court reversed the Kansas Supreme Court in the Cities Service Gas Co. case. In that case, the Kansas Hugoton field order specifying a minimum gas price of 11 cents per Mcf was upheld by the Kansas Supreme Court, but nullified by the highest court in the land. In effect, the United States Supreme Court ruled that Congress occupied the province of gas price fixing for interstate wholesales, and that such sales are subject to the exclusive regulation of FPC.

**• Nationalization of the gas business**

Eight oil and gas associations filed "friend of the court" briefs in the Saturn case. They emphasized the hardships that will fall upon the large number of independent natural gas producers if they are subjected to the drastic controls of the Natural Gas Act. Saturn asserted that the act was never intended to apply to wellhead sales of gas, because such sales are made during production and gathering and are only technically consummated in interstate commerce. Saturn painted a sad picture of the impact on the nation's economy of this impending nationalization of the gas business. The Federal Court stated:

"The argument, however, is not based on any constitutional ground. It goes merely to the wisdom of the act. That is a question for Congress, not for the courts.

"In the final analysis the question resolves itself into a determination of whether the Phillips decision is to be viewed in the light of its precise facts or in the light of the broad language of the court. We are convinced that the court with full recognition of the precise facts, which it detailed in its opinion, carefully refrained from basing its decision on the inapplicability of the exemption and held that the production or gathering exemption of section 1(b) did not apply to exclude from the jurisdiction of the commission sales by any producer of natural gas for transportation interstate for resale to the public. We are bound by the Phillips decision."

**• Conclusion and congress**

The Federal Power Commission's jurisdictional rings are plainly visible around Saturn, and those in the same orbit. The best remaining hope of the 8000 independent natural gas producers is emancipation legislation. When it is timely, the next great conflict will be the battle of Capitol Hill with the gas producers on one side and the mayors of large cities in consumer areas on the other. ▪

# The touch of tomorrow in today's gas range

THE "touch of tomorrow" for today's housewife may be here with the introduction of what Sunray Stove Co. terms the "world's first remote control, push-button gas range."

A series of seven heat-range buttons is provided on the chrome-framed backguard panel (see photo). Mrs. Homemaker merely selects the temperature she wishes for the food she is preparing and pushes that button. Instantly the gas flame answers her command. The push-button convenience offers all the advantages of electronic push-button control with the benefits of gas cooking.

The push-buttons control three top burners. The fourth is a thermostatically controlled top burner. Sunray's top burner anticipates the heat requirements of the food and matches temperature to pre-set controls. Also featured in the range is a giant baker's oven with complete time and temperature controls. A selector switch on the backguard-director panel controls either the oven or the thermostatically operated top burner. The homemaker can now leave her kitchen and be assured that her top-of-stove cooking will be started at the perfect temperature for serving when she returns.

Also featured in the range is the Saf-Tee-Kee, a device that locks the range and prevents accidental turn-on.

In answer to the plea for easier-to-clean appliances, Sunray uses the Catchal-ator, which traps and wraps all oven spillovers. If a spill should occur, the homemaker merely rolls out the aluminum foil, trims it off with the cutter provided, wraps it, and tosses it in the waste disposal container.

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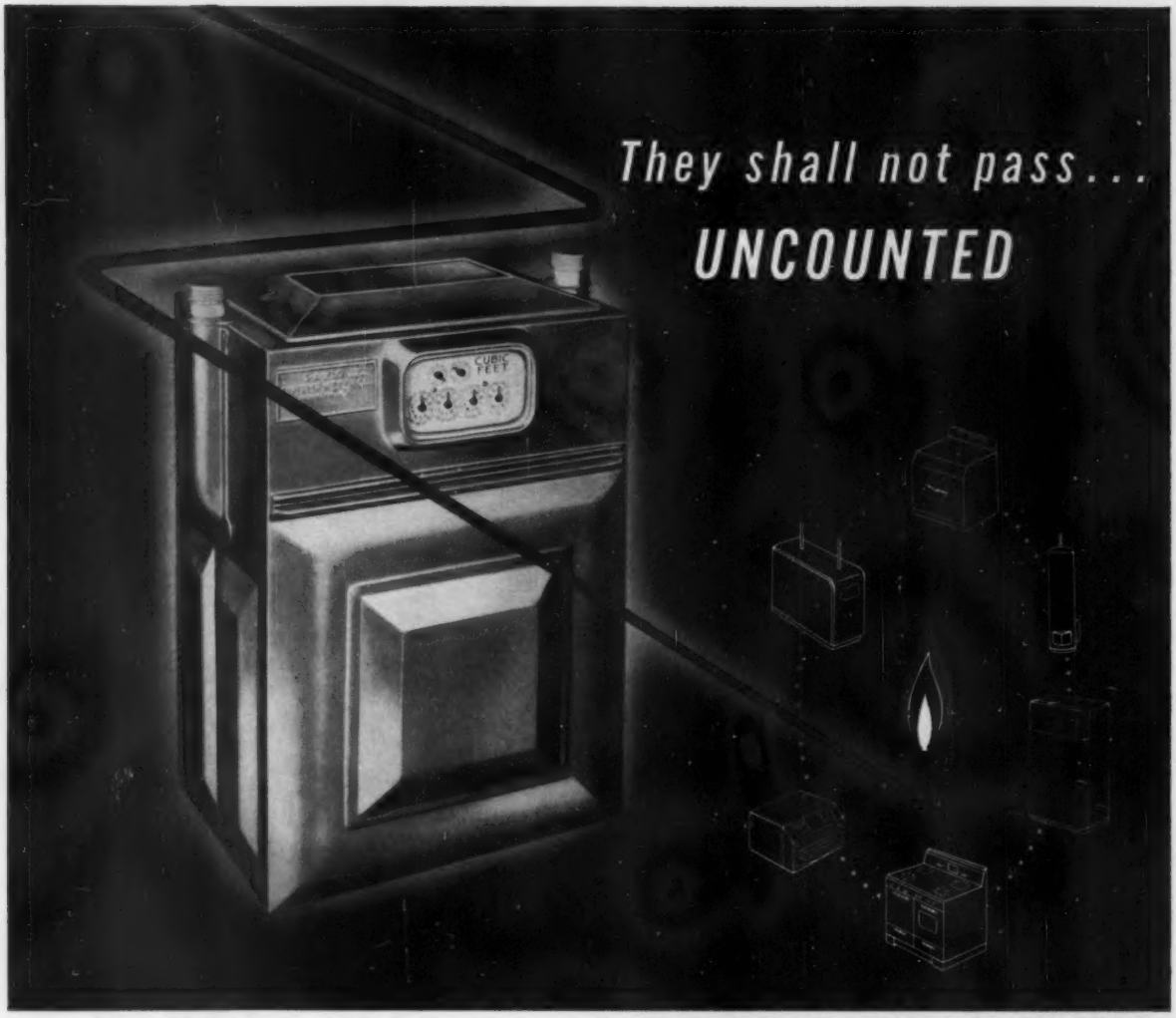


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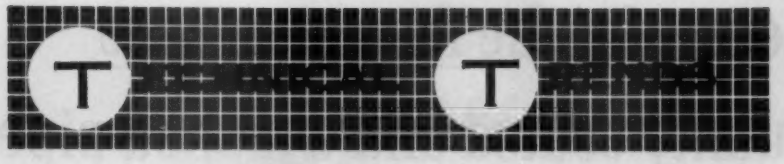

By GUY CORFIELD

## Drilling 50,000 Ft Deep

The Russians recently asserted that they had equipment to drill a 50,000-ft (10-mile) hole, and were waiting only to select the best location for it. This aroused American drilling engineers to the extent of speculating on the technical difficulties, and reaching the conclusion that they could do this also if they wanted to.

It was agreed that the biggest problem would be temperature. Estimates of the temperatures at 50,000 ft varied from 450 to 1175°F, with 900° being considered the most likely figure. This would be too high for present equipment, but not beyond the resistance of materials now being developed. Drilling bits would have to be redesigned and probably be kept cool with refrigerated "mud"; this would entail development of special mud, and much more powerful pumping equipment. Similarly, stronger drill pipe, and means for handling it, would be necessary. A "round trip," to bring up the bit and send it down again, would take about 24 hours.

There would also be electrical problems in designing the logging equipment (to test the characteristics of the formations as they were penetrated) to resist the higher temperatures. There would be no difficulty in constructing cable strong enough to support its own weight and that of the logging apparatus at 10-mile length. Currently developed casing and tubing could be used. New cements would have to be developed.

## Precision measurements

The technique and need for precision measurements are increasing almost beyond the ability of the mind to comprehend—certainly beyond the ability of the eye to see. One-thousandth of an inch used to be considered extreme accuracy and excellent manufacturing tolerance. Now a few millionths of an inch are necessary for production, for instance, of transistors, fuel injection pumps, missile gyroscopes, etc.

The National Bureau of Standards used to be the only agency making or certifying precision measurements. This work got too much for them, and two commercial firms are now specializing in this field. The bureau, with funds from both industry and government, is researching on further refinements in accuracy and has already built an instrument that can measure one ten-millionth of an inch, by comparing with a fraction of wave length of light.

Such measurements and precision entail associated facilities and plant designs. Buildings or rooms must be vibration-free, and perfectly temperature controlled and air conditioned. Workers must be specially dressed and extremely careful in their movements and motions, placement of tools, etc. In some operations flakes of dandruff or specks of face powder cannot be tolerated. In some instances warmth of breath or radiant heat from hands must be deflected to prevent heat distortion.

## Pyrophoric metals

Pyrophoric metals are those which, under conditions not always understood or expected, may ignite spontaneously. These metals include plutonium, uranium, thorium, zirconium (best known in connection with atomic energy); also magnesium, calcium, potassium and sodium. Such metals, with the possible exception of magnesium, are not of direct concern to the gas industry. However, the theory of their pyrophoricity, and the ignitability of many metal dusts including aluminum and possibly iron, are of interest as related to combustion processes. The following notes are from an article in the October, 1957, Quarterly of the National Fire Protection Association.

The combustion of metals is analagous to that of liquids in that it involves an air flammable vapor. The free burning of metal will only occur at temperatures well above its melting point. At these temperatures the vapor pressure of the metal is within the range of vapor pressure of liquids at which vapor is evolved rapidly enough to burn. It follows then that solid metal will only burn when it has been heated above its melting temperature and sufficient heat is evolved, or received from an external source, to cause continued vaporization. However, if the metal has a powdery surface, or is rough with cracks and voids and porosity, the sustaining of vaporizing or combustion temperatures is much more likely.

Metal powders possess a much greater surface area on which to generate heat. They provide less opportunity for dissipation of the heat, by conduction inward or radiation to surroundings, than is the case with solid metal. Furthermore, accumulation of heat generated within metal powders by slow oxidation becomes increasingly probable with increasing size of the powder mass and with decreasing powder particle size. In fact, it appears that for a pyrophoric metal powder of given particle size, there exists a definite minimum quantity of metal that must be exceeded for spontaneous ignition to occur; and as the particles are smaller, the quantity for spontaneous ignition decreases. In these respects the spontaneous ignition of metal powders is similar to that of oily rags.

Metal powders dispersed in air can also be ignited and will burn with explosive violence similar to that of a combustible air-vapor mixture. The finer the powder the more readily it will ignite. There is also considerable evidence that moist powder or powder in moist air will ignite more readily than under dry conditions. This is not fully understood, but thought to be because the moisture produces traces of metal hydrides or peroxides which help to promote the ignition.

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# WASHINGTON

By NEIL REGEIMBAL
GAS Washington Bureau

## Current session holds little hope

THE gas industry is a good bet to go home from Washington at the end of the current congressional session empty handed, and in worse shape than when it arrived full of optimism in January.

If the Harris-O'Hara gas bill isn't dead, it has another serious case of moneyitis. The chances for passage of any other natural gas legislation this year are practically nil.

It'll be next fall before the U. S. Supreme Court takes a look at the Memphis case controversy, and probably mid-winter before a decision is handed down. And the chances for a decision favorable to the pipelines and the Federal Power Commission aren't overly bright. Officially, the FPC is not abiding by the Memphis case until it is reviewed by the high court. But there's been little confidence restored in the industry as a result of the FPC position.

All things considered, 1958 promises to be a dismal year for gas producers and pipelines as far as Washington is concerned. For distributors, it varies depending on which side of the fence they're on.

For the gas industry as a whole, another puffy public relations shiner graces its collective face.

As the time neared when the gas bill would either have to stand for a vote or be washed away by the time factor, neither opponents nor proponents were willing to publicly call the measure dead. The mayors of the big northern consuming areas and the "consumer-minded" union groups fighting the bill warned that they could afford no letdown. Most proponents similarly publicly said they were still trying to line up a few more necessary votes and the bill would pass.

But, privately, the proponents admitted they had given up hope for this year, even though the death-dealing Texas Republican dinner fiasco hadn't affected the merits of the compromise gas measure.

It was generally agreed that if the Harris-O'Hara bill hadn't passed the House—the big hurdle —by the end of April, there would be little point in bringing it to a vote. (Unconfirmed Capitol cloakroom conversation had it that a poll taken in the House showed it was about 75 votes short of passage a few weeks after the fund-raising dinner incident.)

There were several almost panic methods proposed by the backers of the Harris bill principle to salvage something.

One was to attempt to get the White House to demand the bill's passage not on the basis of aiding the gas industry, but on the basis of helping the "depressed" coal industry. The bill would contain a provision prohibiting dump sales of gas by pipelines to industrial customers.

Another was to tag a new amendment on the bill reversing the hated Memphis decision, and try to sell it as an anti-recession measure.

Still another proposal, and perhaps the most serious of all, came from an unusual combination of gas producer supporters and opponents. This is a measure introduced by Sens. Russell B. Long (D., La.), Joseph S. Clark (D., Pa.), Estes Kefauver (D., Tenn.), and Ralph Yarborough (D., Tex.) in the Senate, and Rep. Torbert H. Macdonald (D., Mass.) in the House.

This measure is a revival of an old so-called "compromise" gas bill which would flatly exempt independent gas producers with an annual sales of less than 2 billion cu ft a year in interstate commerce.

In introducing the exemption measure in the Senate, Sen. Long said that "since the day when Republican National Committeeman from Texas, Jack Porter, sent out requests for contributions to a fund-raising dinner in Houston for the Republican Party, the Harris-O'Hara bill has been as dead as a door nail, insofar as this Congress is concerned."

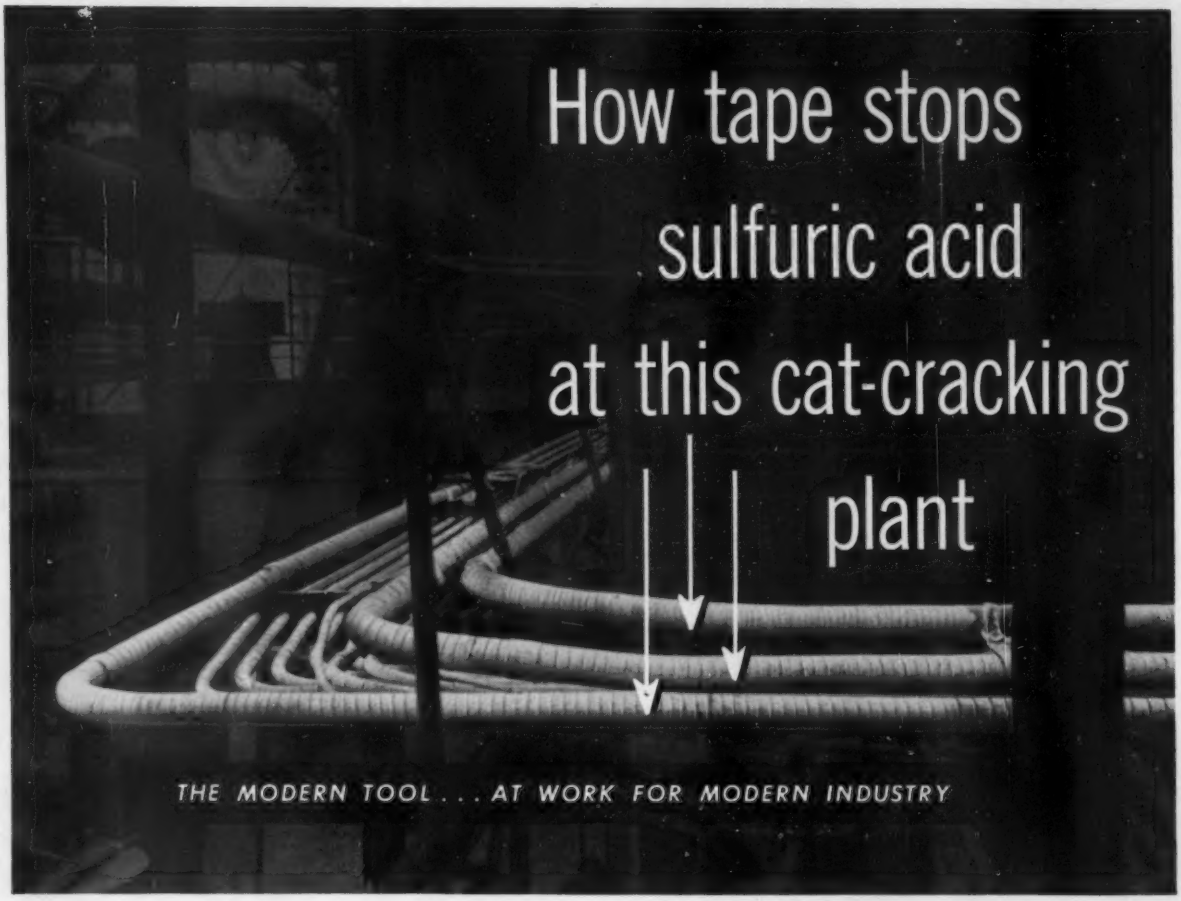
A few days earlier, Rep. Joseph P. O'Hara (R., Minn.), a co-sponsor of the gas bill, said he believed the bill was dead for this year. He said he doubted if it would even be called up for a vote.

At one point, the bill's opponents were feeling so cocky that they dared the backers to bring it to a vote. If it was put to a vote, they jubilantly claimed, it would suffer a "resounding defeat" which would "prod the Federal Power Commission into effective regulation of the industry."

Sens. Kefauver and Clark, long opponents of natural gas legislation, said they would not support the Harris-O'Hara bill, but would vote for the exemption bill. In exchange, Sen. Long agreed to oppose any effort to pin the substance of the Harris bill onto the exemption bill should a serious drive to pass the latter measure get underway.

Rep. Harris has been displaying more than a little annoyance with the problems he's encountered

*Continued on page* 98

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# CORROSION PREVENTION

Edited by MARSHALL E. PARKER

## Internal coating of gas transmission lines

*R. M. Johnson*
*Coast Paint & Lacquer Co.*
*Houston, Texas*

AT the present time there are approximately 1000 miles of large diameter pipe internally coated. The following facts have come forth over the past five years:

1. *Protection in storage*—Many transmission companies store pipe. Some have pipe in storage for future needs and others had pipe accumulate at different locations during pipe shortages. Inspection of coated pipe in storage shows no deterioration after two years.
2. *Dusting in lines*—Rust and scale traveling through a line definitely subject expensive valves to excessive wear, reducing valve life. Lines which have been internally coated all but eliminate this condition.
3. *Inspection of metal easier*—It was established that pipe after internally coating showed defects that were not visible on the bare pipe. Joints previously passing inspection were shown to have laminations and other defects.
4. *Increased thru-put*—Although no definite facts have come forth on proven increased thru-put, a lot of work has been done to theoretically establish what increase could be effected by internal coating.

Total acceptance of interior coating in gas transmission lines will probably come about when definite proof of increased thru-put is established.

In the work done by others, an average effective surface roughness for rust-free pipe as received from the mill is 0.7 mils. The average surface of seven different samples of pipe from various locations and suppliers, and free of corrosion pitting, was 0.76 mils.

If a pipeline has a calculated flow efficiency of 100 per cent with an effective surface roughness of 0.00045 in. (very smooth commercial pipe), consider the effect on flow efficiency produced by (1) run-of-the-mill commercial pipe with an average effective surface roughness of 0.0007 in. (2) Pipe which has been in storage for a minimum period of six months with an average surface roughness of 0.0013 in. (3) Pipe coated before any corrosion has occurred which has an average surface roughness of 0.00028 in.

The pipeline flow efficiencies would vary relatively to effective surface roughness and the following comparison must be considered:

| | Effective Surface Roughness | Pipe Line Flow Efficiency, Per Cent |
|---|---|---|
| Coated pipe | 0.00028 in. | 103 |
| Very smooth comm. pipe | 0.00045 in. | 100 |
| Average comm. pipe | 0.0007 in. | 95 |
| Stored pipe | 0.0013 in. | 92 |

If this comparison is valid, an average increase in efficiency of 8 per cent will be approached by coating commercial pipe as it is produced at the mill.

A difference in flow efficiency of 11 per cent could be expected if coated pipe is compared with uncoated pipe exposed to the atmosphere for a short period of six months.

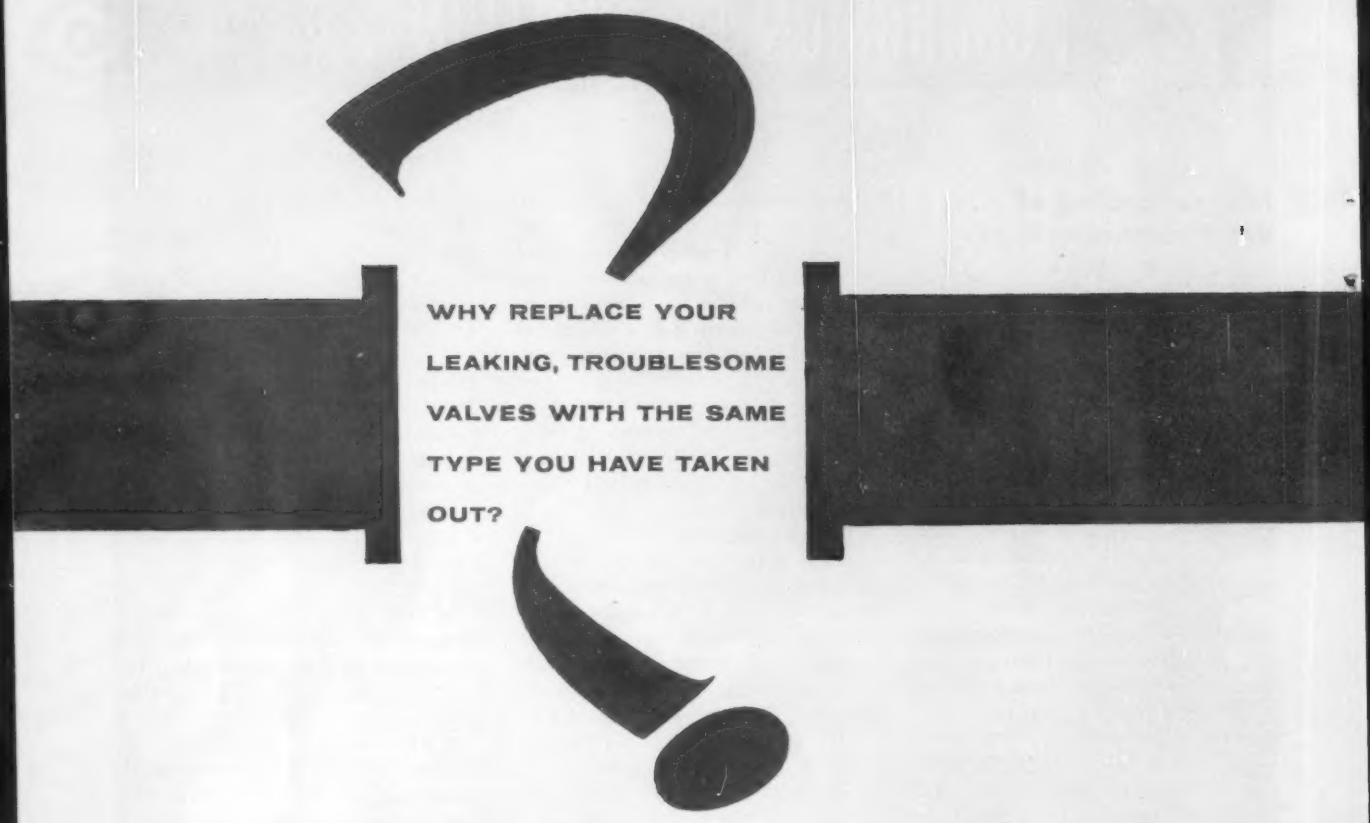
Further work along this same line by applying Colebrook's equation has shown a substantial increase in thru-put.

The ideal location for application by the joint would be close to the mill where pipe is fabricated. Pipe fabricated from plate which has been pickled presents an excellent surface for coating. Pipe that is expanded in fabrication eliminates most of the problem of troublesome mill scale.

The outlook in the future is bright for internal coating of gas transmission lines. It is possible that in the not too distant future that the biggest percentage of pipe will be interior lined. ■

ACKNOWLEDGEMENT: This article is condensed from a paper delivered by the author before the 14th annual conference of the NACE, in San Francisco, March 17-21, 1958.

Cleaning head of internal pipe coating machine makes back pass out of pipe joint, spraying corrosion resistant paint as it goes. This particular pipe was internally coated for Transcontinental Gas Pipe Line Corp.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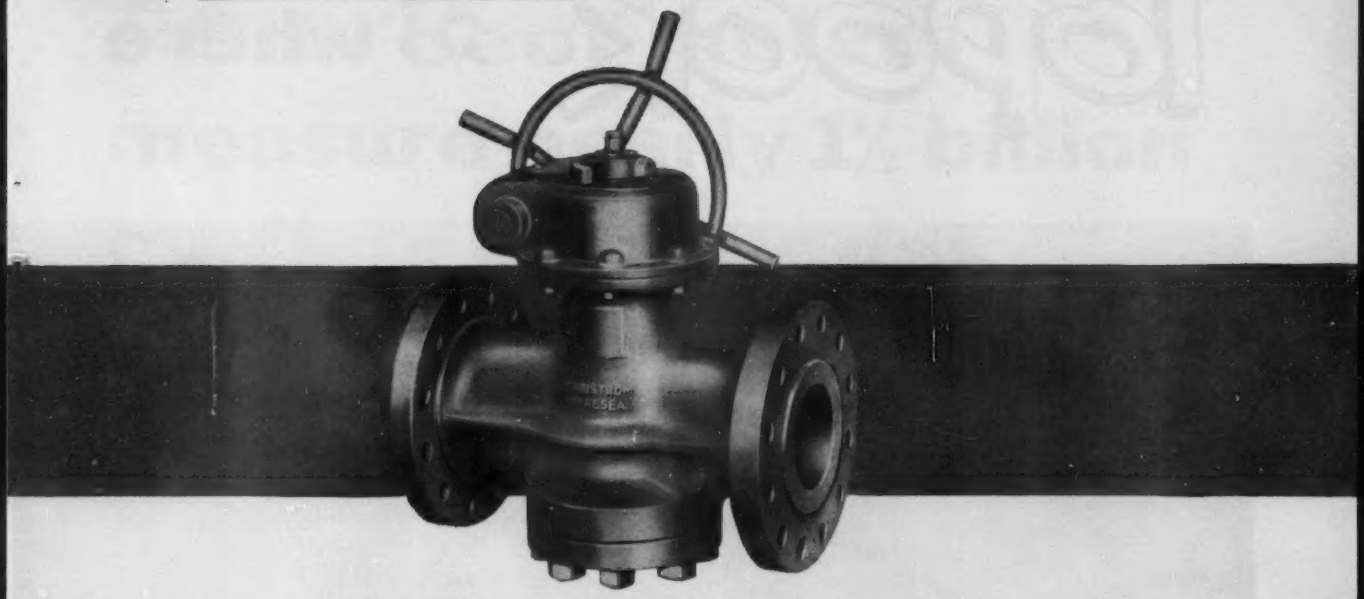

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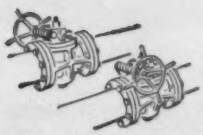

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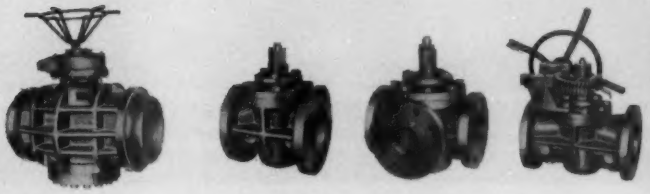

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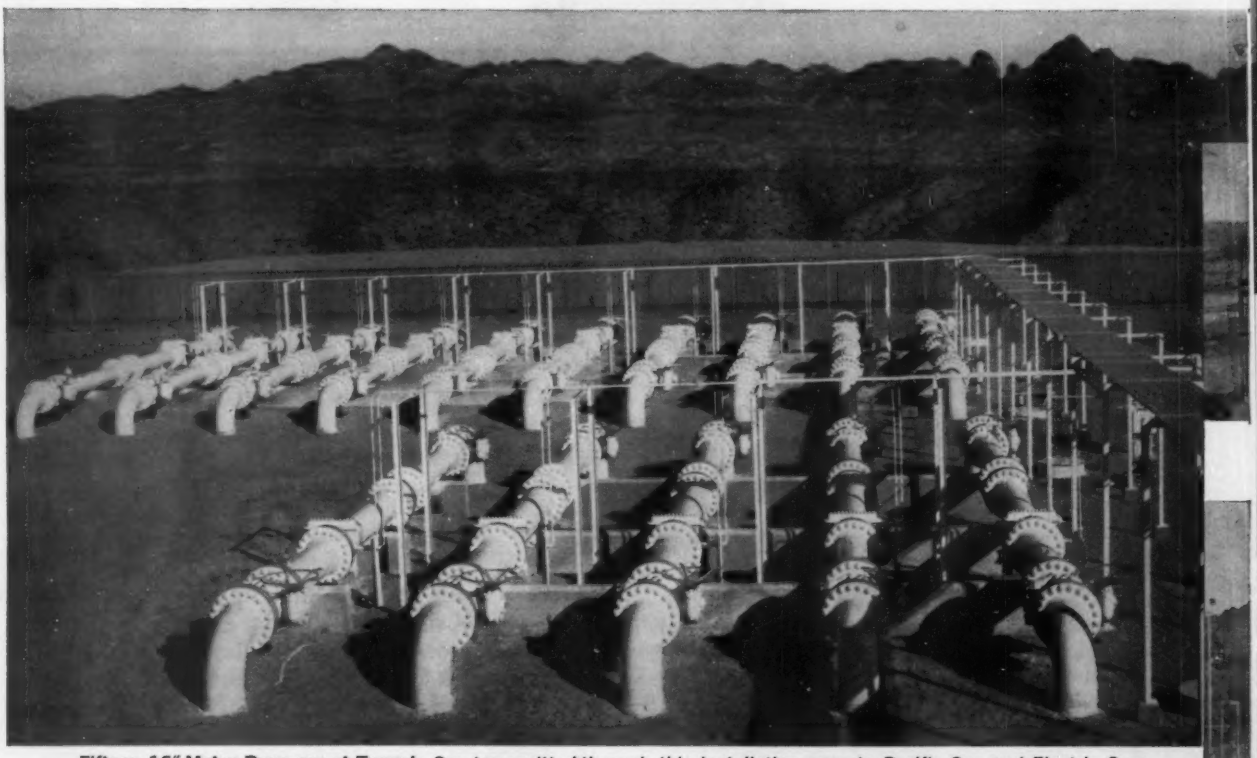

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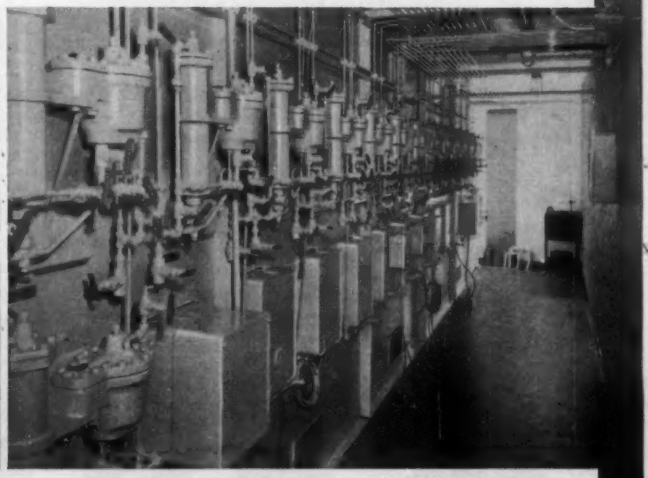

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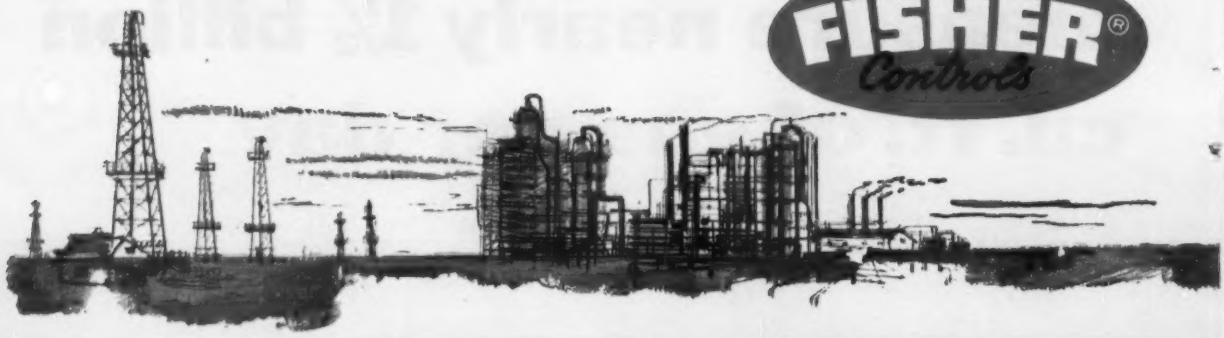

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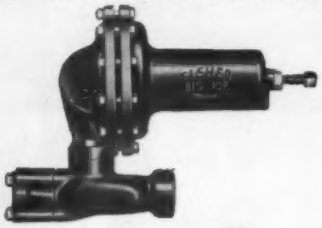

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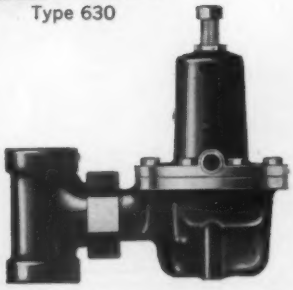

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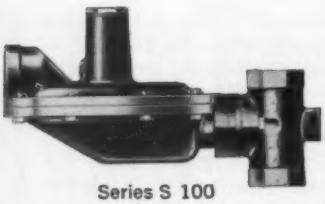

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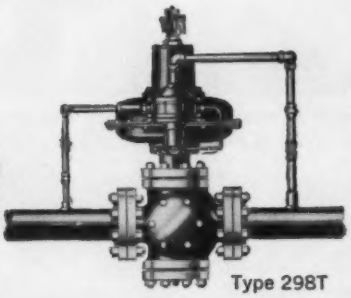

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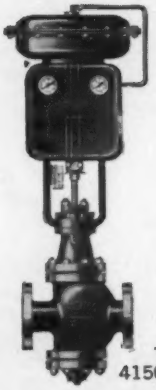
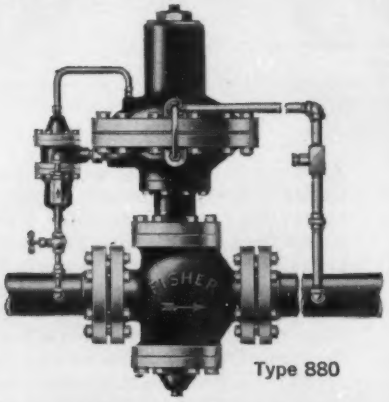
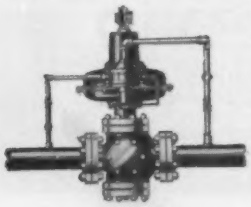
HIGH PRESSURE REGULATORS



Type 4150—657-A



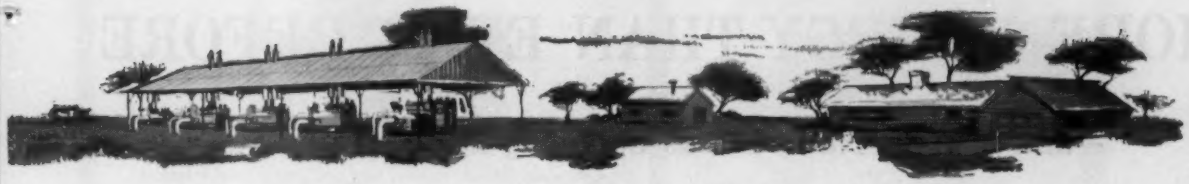
Type 880



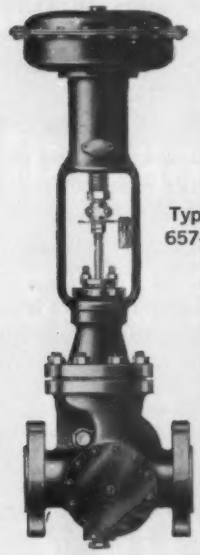
IF IT FLOWS THROUGH PIPE ANYWHERE IN THE WORLD . . . CHANCES ARE IT'S CONTROLLED BY . . .

# point in the gas industry

*From the gas well...*
*to the gas consumer...*



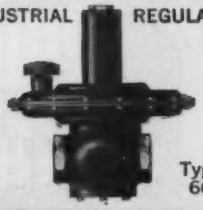
METER RUN VALVES



Type 657-L

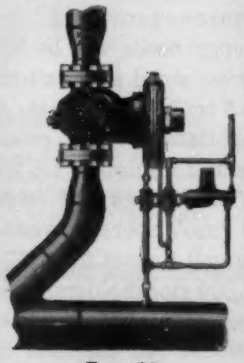
Today when an experienced gas man says, "Let's install a Fisher", he knows from the experience of past installations that Fisher regulators are engineered to stand up to the job—without pampering or undue servicing. Whatever the control point, from the wellhead to the consumer, there's a Fisher precision control regulator to handle the transmission and distribution of gas safely and surely. More than three-quarters of a century of close association with the gas industry has given Fisher engineers an intimate knowledge of the industry's control problems.

INDUSTRIAL REGULATORS

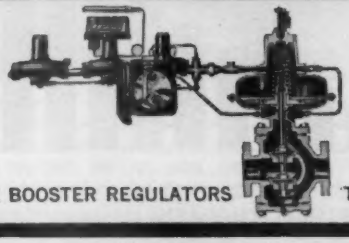


Type 66

SAFETY RELIEF VALVES



Type 29

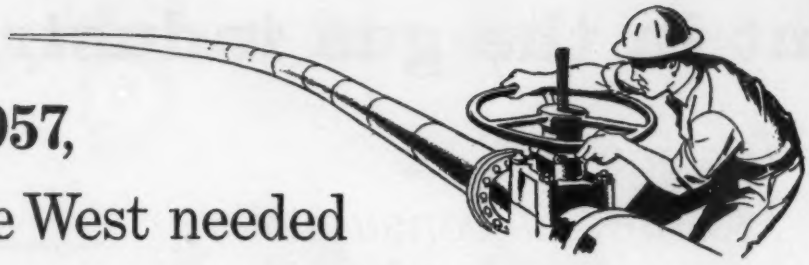


PRESSURE BOOSTER REGULATORS Type 298—831 LTC

Type 282—6301

FISHER® Controls
SINCE 1880

**FISHER GOVERNOR COMPANY**
Marshalltown, Iowa/Woodstock, Ontario/London, England



# In 1957, the West needed MORE ENERGY THAN EVER BEFORE

## *—and El Paso Natural Gas Company again set records in supplying the West's fastest growing fuel*

In 1957, El Paso Natural Gas Company continued its biggest job—finding, transporting and furnishing energy for the West.

More energy was consumed than ever before by the millions of people and by the thousands of industries in this great area.

And natural gas played a bigger part than ever in supplying this energy.

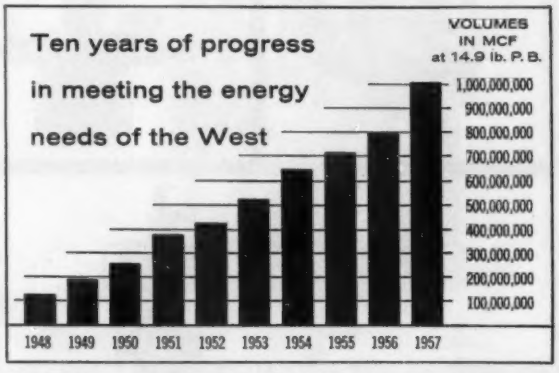
Next year—and in decades to come—the use of natural gas in the West is expected to soar to even higher levels.

Of key importance is the fact that the controlled gas reserves of El Paso and its subsidiary, Pacific Northwest Pipeline Corporation, continue to increase—providing insurance that tomorrow's energy needs will be met. At year's end, such reserves stood at an all-time high of approximately 35.5 trillion cubic feet. And El Paso had completed negotiations with producers for long-term contracts for another 1.8 trillion cubic feet of gas.

These facts and other information relating to El Paso's operations are set forth in the Company's Annual Report for 1957, which has been mailed to 47,800 stockholders. This report summarizes progress made in serving the West in the past year, and includes for the first time operating figures for Pacific Northwest Pipeline Corporation. In 1957, operating revenues reached a record high of $301,090,537, with consolidated net income of $34,506,238. This is equal after dividends on Preferred Stocks to $2.39 per share on 11,795,041 shares of Common Stock outstanding (excluding 5,226,903 shares of Common B Stock which did not participate in dividends in 1957).

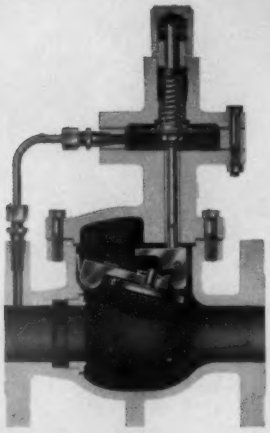
Looking to the future, the Annual Report also outlines plans for expansion and describes pending projects (including a 511-mile pipeline from Twin Falls, Idaho, to Las Vegas, Nevada) to increase the volume of gas delivered daily to its markets.

*Copies of El Paso's 1957 Annual Report to Stockholders are available by writing to El Paso Natural Gas Company, El Paso, Texas.*

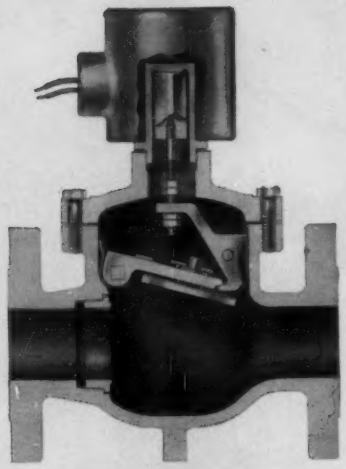



*In 1957, El Paso Natural Gas Company furnished more than a trillion cubic feet of natural gas to customers in the West—a new record for the Company.*

EL PASO NATURAL GAS COMPANY

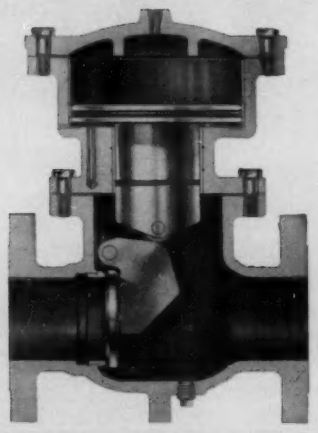


**Model 1500H** shown, is a high pressure shut-off valve which closes automatically and instantly when predetermined high pressure is reached. With addition of a fusible metal plug, valve can be furnished to shut off on overpressure and/or over-temperature. With control pressure above diaphragm, valve can be made into a low pressure shut-off valve. Combination high and low pressure shut-off also available.



**Model 1700** shown, is a Solenoid operated valve normally energized to maintain valve in open position. On interruption of electric current valve closes instantly. Model 1800 Solenoid shut-off valve available to shut off gas instantly by applying electric current either automatically or through a "panic" button.

# Instant action, sure and safe with Coppus Sentry® Valves



**Model 3000** shown, is a piston operated valve, which opens instantly when pressure above the piston is released. Restoring the pressure above the piston closes the valve. The operating pressure above the piston can be obtained from the line or from an independent source of gas or liquid and can be automatically released or applied by instrument air or gas operated pilots or by use of a small three-way Solenoid valve.

Sentry Valves assure better protection of personnel and property. Instant, split second action with full flow, available in two basic types. Sentry Latch type valves for instant automatic closing; Sentry Piston type valves for automatic opening and closing.

The Latch type requires manual reset — the piston type can be opened and closed automatically.

Sentry Valves can be actuated by high or low pressures, by excessive temperatures, by excessive flow or electrically by use of a Solenoid.

Standard sizes — all Full-Flow — in steel or meehanite 1½" to 8".

To get more detailed information on this outstanding line of Coppus Sentry Valves send the coupon.

ANOTHER
COPPUS
"BLUE RIBBON" PRODUCT

**COPPUS ENGINEERING CORPORATION**
604 Park Avenue, Worcester 2, Mass.

Please send Bulletin 500.

Name.....

Company.....

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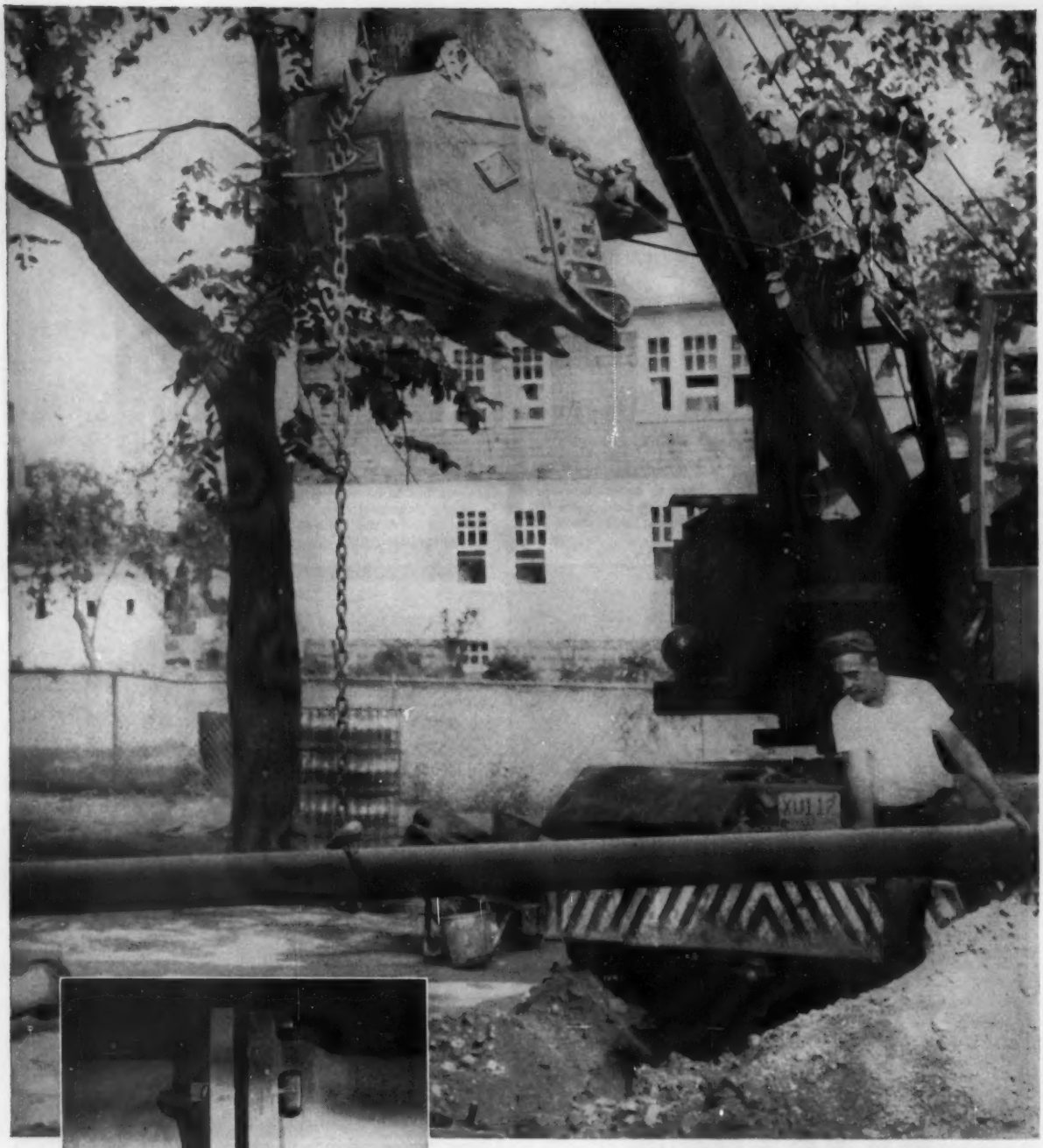
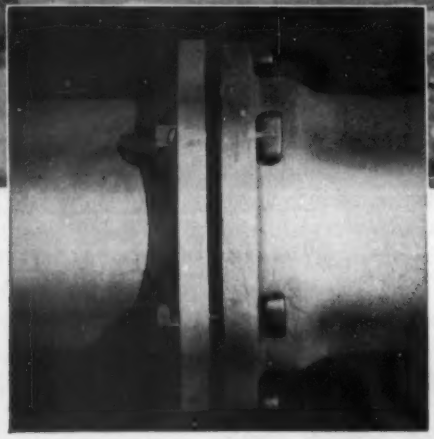
.....





Installing 6" Mechanical Joint Cast Iron Pipe gas distribution main in Rhode Island.

CAST IRON

Cast Iron Pipe Research Association, Thos. F. Wolfe, Managing Director, Suite 3440, Prudential Plaza, Chicago 1, Ill.

# MECHANICAL JOINT cast iron

# this pipe will serve your great-grandchildren

## the record proves cast iron stands up

A century and more from now rugged, dependable cast iron will still be serving faithfully long after lesser pipe has worn out and been replaced.

How do we know? What pipe has done, it can do. And the record proves that 57 American gas companies still use cast iron gas mains laid over a hundred years ago! Companies with fifty year and older mains are common.

Add the fact that *modern* cast iron pipe, centrifugally cast, is even tougher, stronger, more uniform.

The conclusion is clear. For dependability, long life, long-term economy your best bet . . . your best buy . . . is cast iron.

**A FEW OF THE 57 GAS UTILITIES WITH CENTURY-OLD CAST IRON MAINS IN SERVICE**

Bridgeport Gas Light Company, Bridgeport, Conn.—The United Gas Improvement Co., Gas Division, Carlisle, Pa.—The United Gas Improvement Company, Catasauqua, Pa.—Borough of Chambersburg, Gas Department, Chambersburg, Pa.—South Carolina Electric & Gas Co., Charleston, S. C.

**MODERN CAST IRON PIPE IS EVEN MORE EFFICIENT**

- Centrifugally cast, it's tougher, stronger, more uniform.
- Standardized mechanical joints are bottle-tight under all gas distribution pressures . . . for all types of gas.
- Uniform wall thicknesses.
- Joint design allows deflection during and after installation.
- Service lengths and variety of standard fittings cut time and labor in congested undergrounds.

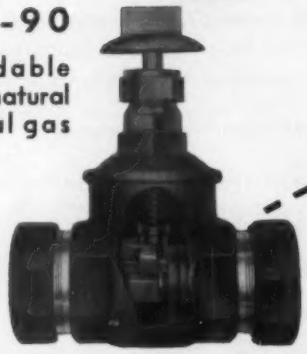
**pipe** FOR MODERN GAS DISTRIBUTION

THESE PRECISION-GROUND SURFACES ASSURE

# A PERFECT SEAL WITHOUT LUBRICATION!

## LIST G-90

For dependable control of natural or artificial gas lines.



**Iron body valve, bronze mounted, with mirror-finished gate and seat. Dresser couplings for use with steel pipe permit quick, simple installation without special tools and are unaffected by temperature changes, ground vibrations or tremors. *Above: 2-inch valve, showing Dresser coupling assembly and internal wedge and gate mechanism.***

Held tightly by the patented closing wedge, the mirror-finished gate and seat surfaces of the List G-90 valve are precision-ground to provide the perfect, cohesive seal. Absolutely *no lubricant necessary . . . ever!*

Write today for full information on List G-90 valves — specified by leading gas companies for over 50 years.

**LUDLOW & RENSSELAER**

**VALVES AND HYDRANTS**

THE LUDLOW VALVE MANUFACTURING CO., INC., TROY, N. Y. SINCE 1861

# it's NEW! the Ottawa BACKHOE now mounts on the CHEVROLET TRUCK!

## WITH NEW IMPORTANT FEATURES!

**• Digs 12½ feet deep • Has 190° continuous swing • Turret-type seat pivots with boom • Reverse-mounted cylinders place rods up safely from rocks and dirt • Rod-fed cylinders do away with exposed hydraulic lines • "Bite" has 7,000 lb. force at bucket edge • Two levers (dual "One-Trols") control all backhoe actions • Ejector bucket automatically forces all wet sticky material from bucket • Hydraulic laydown shifts backhoe up and over rear axle for perfect roadability • Quick on-and-off frees truck for other work in minutes!**

**WORK MANY JOBS — IN DIFFERENT AREAS — THE SAME DAY!**

The Ottawa Truck-Mounted Backhoe is designed to meet the need of public utilities, plumbers and contractors for a COMPLETELY MOBILE DIGGER! It's an UNBEATABLE COMBINATION for

**MUSCLE!** The powerful hydraulic system of the Ottawa "Big Muscle" Backhoe provides EXTRA POWER for fast, smooth, economical operation!

**MOBILITY!** Use it anywhere, anytime . . . one job or several jobs at different locations during one day! The Ottawa WORKING UNIT is also the MOBILE UNIT ready to move anywhere with great roadability, ready for operation seconds after arrival at a new jobsite!

**VERSATILITY!** Dig trenches and ditches faster . . . load dirt direct from trench to truck . . . dig square graves that need no hand finishing . . . dig and maintain irrigation channels . . . clean roadside drainage ditches . . . dig building footings and septic tanks . . . use as a boom to lay lightweight pipe . . . the Ottawa Backhoe is COMPLETELY MOBILE to your needs!

Ottawa

**OTTAWA STEEL DIVISION**
Young Spring & Wire Corp.
Ottawa, Kansas

**BUY the Ottawa BACKHOE and the Chevrolet TRUCK! GET the BEST BENEFITS of each . . . PLUS . . . the NEW, DYNAMIC ADVANTAGES of the COMBINATION TRUCK-BACKHOE!**

**AVAILABLE ONLY AT YOUR CHEVROLET TRUCK DEALERS!**

# service!

Hundreds of American gas companies are still using cast iron gas mains laid fifty years and more ago. Fifty five of these, in fact, have passed the century mark in service! What other pipe can approach, much less equal, this unique record? What's more, the modernized cast iron pipe, centrifugally cast today, is even tougher, stronger, more uniform.

"Service" is another name for cast iron.

The record proves it!

## Service is Built Into Cast Iron

- Standardized mechanical joints are bottle-tight for usual gas distribution pressures... and for all types of gas.
- Centrifugally cast pipe is tough, strong and uniform.
- Joint design allows for deflection during and after installation.
- Service connections are easily made.
- Long life a matter of record.
- No shortages. Cast Iron Pipe is immediately available.

U.S. cast iron PIPE

CAST (U) IRON

U. S. PIPE AND FOUNDRY COMPANY
General Office: Birmingham 2, Alabama

GEM Sponsor

A WHOLLY INTEGRATED PRODUCER
FROM MINES AND BLAST FURNACES TO FINISHED PIPE.

- Direct-reading feed and position indicators!
- Full-time position indicator shows boring bar position at all times!
- Easily-set feed indicator automatically shows depth of cut!
- Feed automatically disengages to prevent overtravel of boring bar when travel limit is reached!
- Cuts from 2" through 6".

*Now! automatic cuts under pressure up to 1440 p.s.i. with the*

# NEW MUELLER® CH-6

*Machine!*

New design and new features give automatic operation for faster, safer cuts; more strength for reduced maintenance; simplified operation for use by inexperienced personnel; more compact for easier handling; and standardized tools for simpler tool selection.

NO-BLO

MUELLER CO.

DECATUR, ILL.

Factories at: Decatur, Chattanooga, Los Angeles; In Canada: Mueller, Limited, Sarnia, Ontario

FORM NO. G-8884

Printed in U.S.A.

## NEW *self-adjusting boring bar packing*

High temperature chevron packing is spring-loaded to insure positive, leakproof sealing without packing adjustments. Line pressure does not enter case.

## NEW *rugged all-steel construction*

All working parts are totally enclosed in a galvanized steel case to permit complete lubrication and to prevent damage from dirt or other foreign matter and from rough handling. Lubricant is sealed in with "O" rings. Large bearing surfaces assure boring bar rigidity.

## NEW *power or hand operation*

May be hand operated with ratchet handle or power operated with Mueller H-601 Air Motor or Mueller H-602 Gasoline Engine Drive Unit. No changes are required in the machine to use hand or power operation.

## NEW *handling ease*

Telescopic design reduces over-all length and weight. Conveniently placed handles and lifting yokes permit easy handling of machine—manually or with hoisting equipment. Front lifting yoke may also be used to lock the boring bar while attaching or removing tools.

## NEW *standardized tools*

Tungsten carbide tipped shell cutters are designed for cutting any type pipe. Tool selection and inventory are greatly reduced. Each shell cutter used for lateral connections is specifically designed ½" under the nominal size. This reduces drilling time and travel required and assures perfect cuts. The outside of the cutter is slightly less than the inside diameter of the pipe being cut. Therefore, the cutter makes a complete, clean hole in the pipe when making cuts that are the same size as the pipe. Cutter arbors for the larger shell cutters are of the "E-Z-Release" type. All pilot drills screw into the cutter arbor to give greater rigidity and perfect centering. Pilot drill contains a mechanical coupon retaining device. The cutter, arbor, pilot drill and coupon can be removed as a unit without first removing coupon.

# NEW CH-6 FEATURES

*. . . designed to reduce your cutting time!*

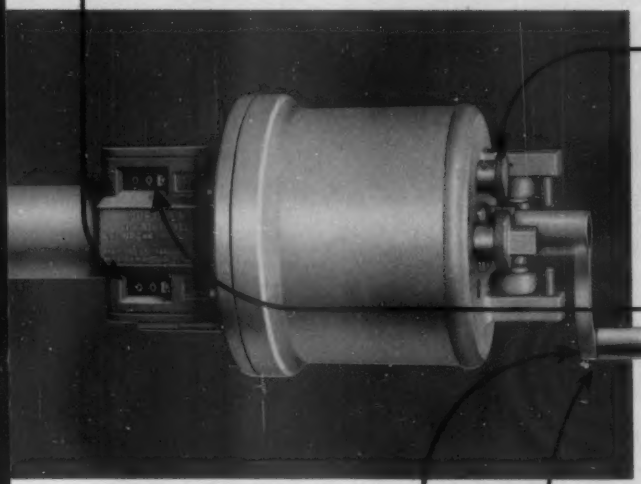
*Now! a new, automatic, high pressure drilling machine for 2" through 6" cuts under pressure in any type of pipe.*

**NEW** *automatic tool position indicator*

Direct-reading indicator shows—at all times—the position of the pilot drill and shell cutter in relation to their fully-retracted or rearmost position. Large numerals read in inches and tenths of an inch and automatically add as the tool is advanced and subtract as the tool is retracted. Eliminates tool position guesswork.

**NEW** *automatic overtravel protection*

Tool feed is automatically disengaged when the maximum 24" travel of the machine is reached. Damage to the machine is prevented—even when the automatic feed has been set for travel beyond the maximum travel of the machine.



**NEW** *automatic feed-setting*

The amount of travel required in automatic feed can be quickly and accurately set in inches and tenths of an inch. This amount is clearly shown on the automatic feed travel indicator to insure accurate settings every time.

**NEW** *automatic feed travel indicator*

As the cut progresses, the direct reading indicator automatically subtracts—always showing the amount of travel remaining in automatic feed. You always know just how much of the cut remains to be made.

**NEW** *two-speed rapid hand travel*

When not cutting, the boring bar may be quickly and easily advanced or retracted by hand. The direct rapid travel shaft is used when working with normal pressures. The geared shaft is used when working with high pressures. Rapid advancement and retraction of the boring bar reduces time of operation.

**NEW** *automatic feed disengagement*

When the preset travel in automatic feed is completed and the indicator reads zero, the tool feed is automatically disengaged to prevent damage and loss of time.

*Check with your Mueller Representative for complete details.*

**MUELLER CO. DECATUR, ILL.**

*specifications*

# MUELLER CH-6 *drilling machine*

## *Capacity and Use*

The CH-6 Machine makes cuts from 2" through 6" inclusive in any type of pipe. It is used with tapping sleeves and valves, standard gate valves, extension stoppers and flanged tees to make lateral connections up to 6"; line stopper fittings to make cuts into pipe up to 6" prior to stopping-off lines; and with Save-A-Valve drilling nipples to make temporary or semi-permanent connections up to 6". All cuts are made under pressure.

## *Working Pressure and Temperature*

1440 p.s.i. at 100° F.
500° F. at 1250 p.s.i.

## *CH-6 Machine and Equipment Furnished*

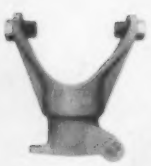
Shipped in Strong Wooden Chest
Total Shipping Weight: 328 Pounds.
Approximate Weight of Machine: 213 Pounds.

## *Equipment to be Selected*

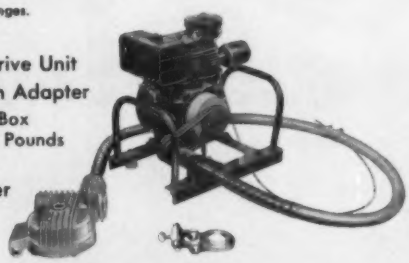
Power Operating Units, cutting equipment (cutter, pilot and hub) and Adapters.

| | For Line Stopper Fittings | | | For Mechanical Joint Tapping Valves and Standard Gate Valves | | | |
|---|---|---|---|---|---|---|---|
| Size of Fitting or Valve | 3" | 4" | 6" | 2" | 3" | 4" | 6" |
| Size of Shell Cutter or Drill | 3¼" | 4¼" | 6¼" | 1¾" | 2½" | 3½" | 5½" |
| Shell Cutter or Drill | 49043 | 49044 | 83647 | 48271* | 83617 | 83203 | 83134 |
| Cutter Arbor | 83637 | 83644 | 83648 | 83632** | 83635 | 83637 | 83640 |
| Pilot Drill | 83634 | 83643 | 83639 | ..... | 83634 | 83634 | 83639 |
| Adapter for Line Stopper Fittings | 83630 | 83630 | 83631 | ..... | ..... | ..... | ..... |
| Adapter for Tapping Valves | ..... | ..... | ..... | 83658 | 83660 | 83662 | 83664 |
| **Adapters For Standard Gate Valves:** | | | | | | | |
| 150 Pound Flange | ..... | ..... | ..... | 83619 | 83621 | 83623 | 83626 |
| 400 Pound Flange*** | ..... | ..... | ..... | 83620 | 83622 | 83624 | 83627 |
| 600 Pound Flange | ..... | ..... | ..... | 83629 | 83622 | 83625 | 83628 |

*Solid Drill is used in place of shell cutter for 2" size.
**Boring Bar Adapter is used with Solid Drill.
***These Adapters may also be used with valves having 300 pound flanges.



H-602 Gasoline Engine Drive Unit with Adapter
Shipped in Strong Wooden Box
Total Shipping Weight: 265 Pounds



H-601 Air Motor Power Unit with Holder
Shipped in Strong Wooden Box
Total Shipping Weight: 95 Pounds

*Order by Quantity and Catalog or Part Number*

NO-BLO

MUELLER CO.
DECATUR, ILL.

Factories at: Decatur, Chattanooga, Los Angeles; In Canada: Mueller, Limited, Sarnia, Ontario

## Why We Make it Better Than Anybody Else!

*Tex-Tube electric resistance weld pipe*

BECAUSE we are the newest pipe manufacturers our reputation is on trial with every piece.

We keep yield points, tensile strengths, and elongations well above the minimum.

We stay well inside specifications on dimensional tolerances.

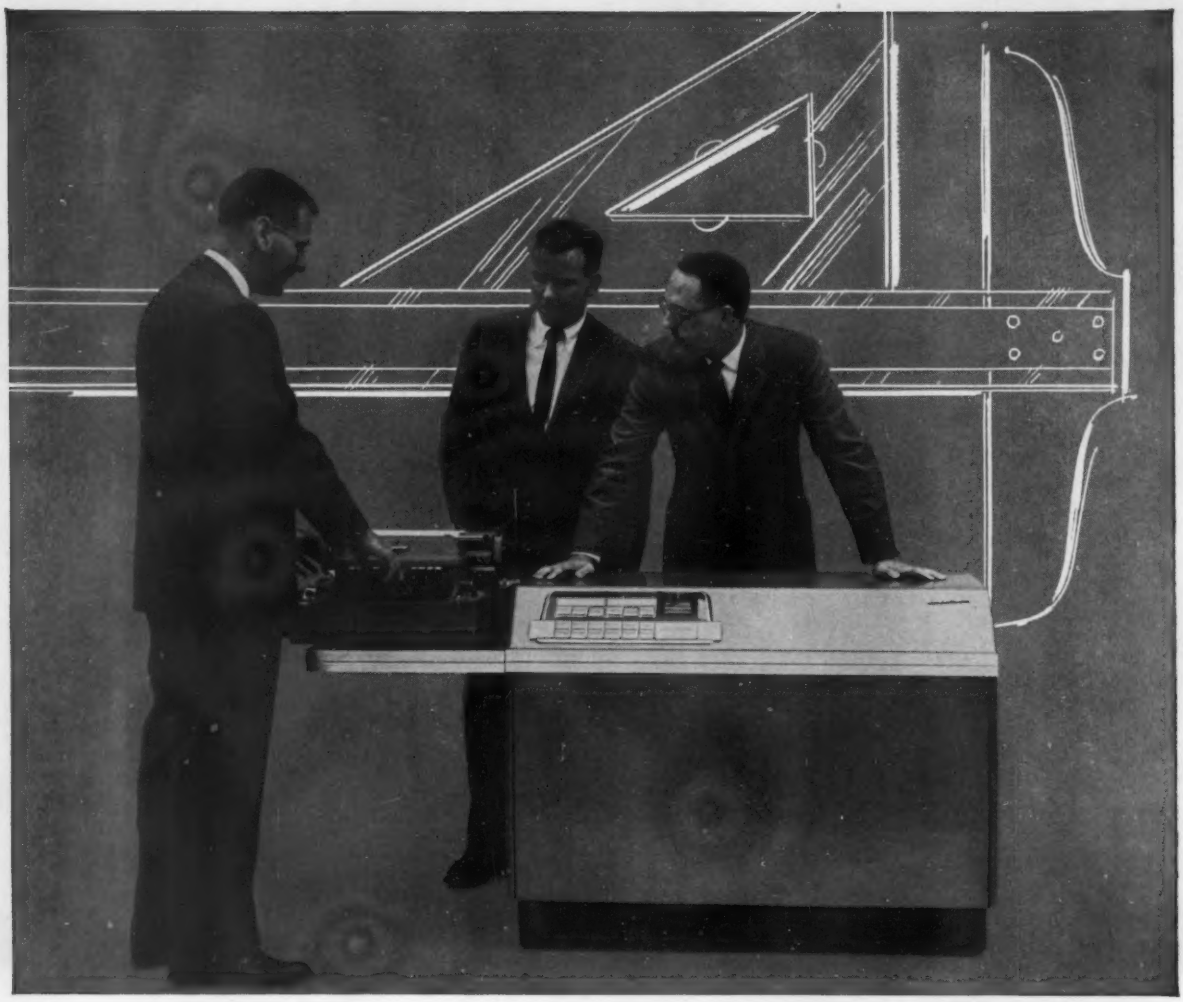
We never ship border line material. We scrap it!

**TEX - TUBE, INC.**

1503 NORTH POST OAK ROAD • HOUSTON, TEXAS

*Sales Offices In Midland, Texas - Tulsa, Oklahoma - Baton Rouge, Louisiana*

LICENSED BY THE AMERICAN PETROLEUM INSTITUTE



# Get greater productivity in highway design with this powerful electronic computer ROYAL PRECISION LGP-30

### Large capacity... easily programmed and operated... mobile... low in cost

Here, at last, is a complete general-purpose electronic computer within the reach of every civil engineering firm. Remarkably small in size, completely mobile, LGP-30 saves time and money in the design of dams, bridges, highways . . . eliminates the tedium of routine calculation by bringing high-speed computation *right to your desk*. And at the lowest cost ever for a complete computer system!

**Faster answers; unusual capacity.** With speed and memory (4096 words) comparable to computers many times its size and cost, LGP-30 gives you fast, effortless answers to such problems as cut and fill, grade profile, traverse closure, field stakeout, bridge design, highway alignment. Self-cooled, LGP-30 operates from any convenient wall outlet, gives you stored-program operation for greater flexibility. (For example, highway design geometry breaks down into approximately 14 different component problems; these may all be stored in the LGP-30 and used in whatever combination is required.) Thus you save valuable time, cut costs, better your competitive position.

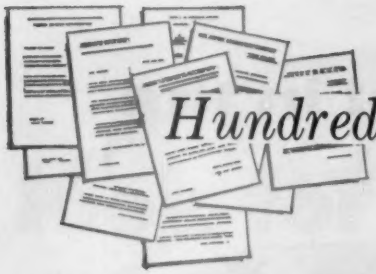
**Easy to operate and program.** LGP-30's remarkably simplified controls may be operated with only minimum computer experience. Answers are printed out directly . . . do not require deciphering. Programming is easily learned. A library of sub-routines, plus programs for a wide variety of applications, are available.

**Wide range; exceptional value.** The most powerful computer of its size yet developed, LGP-30 is the greatest value in today's market. Smallest initial investment ever for a complete computer . . . low operating and maintenance costs. Service available coast-to-coast.

For further information and specifications, write Royal McBee Corporation, Data Processing Equipment Division, Port Chester, N. Y.

**ROYAL McBEE**

WORLD'S LARGEST MANUFACTURER OF TYPEWRITERS AND MAKER OF DATA PROCESSING EQUIPMENT



*Hundreds of Utilities Accepted Our Offer*

# "FREE TEST THIS NEW HOME GAS FILTER at our expense"

The response has been overwhelming! It has proved to us the great need for this economical gas filter for installation right in the home.

It's the economical way to remove dirt, pipe scale, and other foreign matter from natural gas lines, and keep your customers' appliances operating efficiently.

Thousands are already in use . . . hundreds more are now on test. Why don't you take steps to minimize service calls by stopping dirt—the major source of clogged pilots—right in the home?

*Accept our FREE offer*

to give you a Staynew Home Gas Filter without obligation. Test it any way you like, and see for yourself its many advantages. All we ask is that you write us on your company letterhead so we are sure the filter goes only to authorized personnel. Address: Dollinger Corporation, 68 Centre Park, Rochester 3, N. Y.

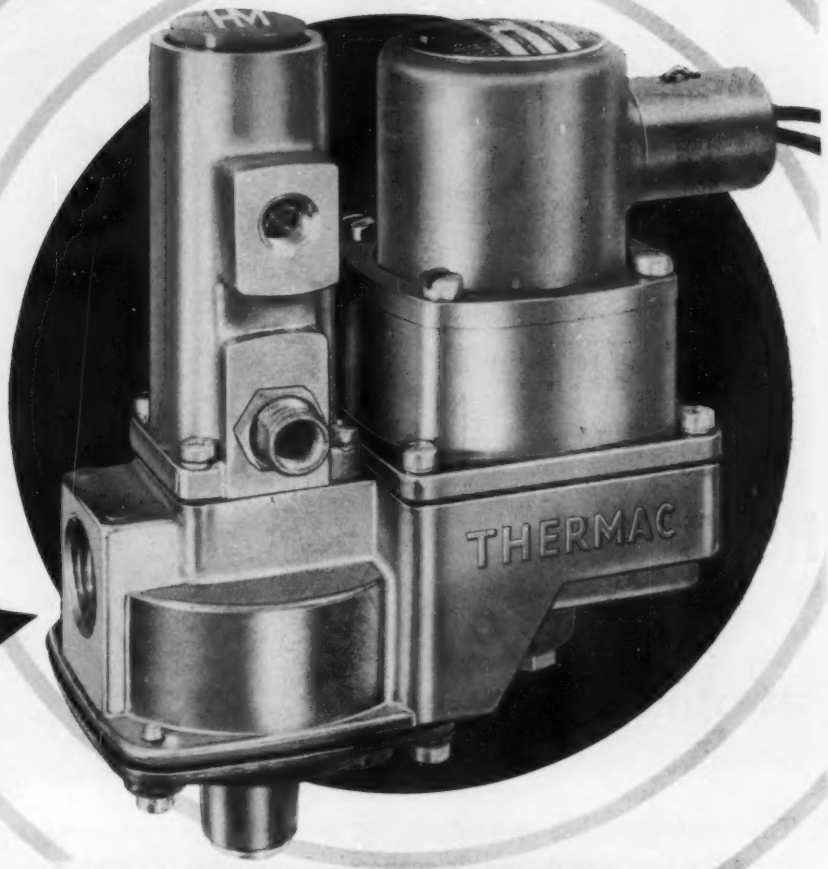
U.S. PROTECTOMOTOR U.S. PAT. OFF.

STAYNEW FILTERS

**DOLLINGER**

LIQUID FILTERS • PIPE LINE FILTERS • INTAKE FILTERS • HYDRAULIC FILTERS • ELECTROSTATIC FILTERS • MIST COLLECTORS • DRY PANEL FILTERS • SPECIAL DESIGN FILTERS • VISCOUS PANEL FILTERS • LOW PRESSURE FILTERS HIGH PRESSURE FILTERS • AUTOMATIC VENTILATION FILTERS • NATURAL GAS FILTERS • SILENCER FILTERS

# For the Mass Market in the Heating Field!




THERMAC Model SLS-121
Unit illustrated has
100% pilot shut off.

## COMBINATION CONTROL

REGULATOR • SAFETY • AUTOMATIC MAIN GAS CONTROL VALVE

***Safe Lighting With or Without 100% Shut off.***

Certified by A.G.A.

In a carefully calculated design based on 25 years gas control experience, THERMAC combines in this three-in-one control every feature important to the appliance builder, the dealer, and the customer. Identical in performance and capacity to the now universally accepted SLS-100, it is ideal where space below the control is limited. The unit consists of a regulator, quiet automatic main gas valve and a 100% pilot shut off when required. A manual reset is available in conjunction with automatic main gas valve. Every component is long proven and well accepted in the gas appliance field.

Drawings, prices and samples of the SLS-120 series are now ready for manufacturers interested in reducing the over-all cost of gas control assemblies.

*Write, wire or telephone for immediate action.*

**THERMAC**

**HM COMPANY**

**14296 East Sixth Street,**
**Corona, California. REdwood 7-3511**

**Distributed in Canada by Ontor, Limited.**

# look for this — symbol

...it identifies all Dresser Companies and their products

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| CLARK BROS. CO. compressors | DRESSER-IDECO COMPANY steel structures | DRESSER MANUFACTURING DIVISION couplings | THE GUIBERSON CORPORATION oil tools |
| IDECO drillings rigs | LANE-WELLS COMPANY technical oilfield services | Magcobar MAGNET COVE BARIUM CORP. drilling mud | PACIFIC PUMPS, INC. pumps |
| ROOTS-CONNERSVILLE BLOWER DIVISION blowers | SECURITY ENGINEERING DIVISION drilling bits | SIE SOUTHWESTERN INDUSTRIAL ELECTRONICS electronic instrumentation | WELL SURVEYS, INC. nuclear and electronic research |

## ...it is your guarantee of the DRESSER *plus*+

You gain an important extra plus value every time you are served by any of the Dresser companies. This is the unique way Dresser operates to serve you better. Each Dresser company works independently to assure maximum individual attention to your specific needs . . . yet all are teamed together in a single organization to provide a group of research, engineering, and manufacturing services. From Dresser you obtain equipment based on the over-all experience of many companies in many industries.

As performance demands on equipment become increasingly greater, Dresser will continue to pace the technological changes in your field. You can count on the Dresser companies as major suppliers of equipment researched and developed to serve you better and meet your future needs.

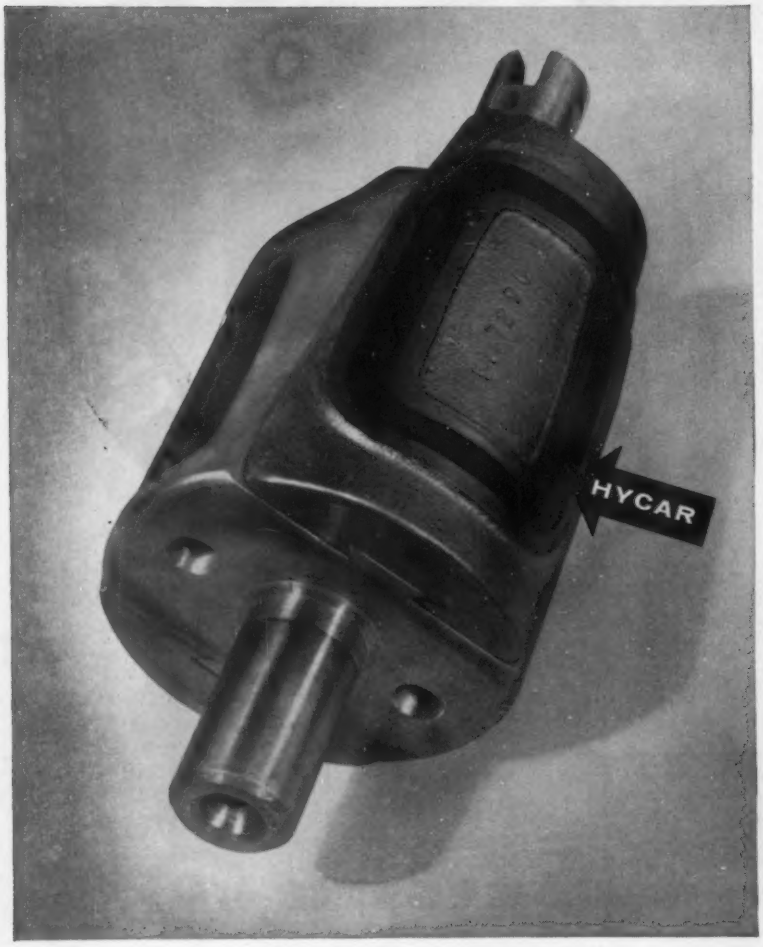
Wherever you are, whatever your needs, specify equipment from Dresser companies. No other single organization offers you the same broad range of "know-how" coupled with individual company attention to these specific needs. Be sure to look for the symbol that identifies the Dresser companies. It's your guarantee of the Dresser *Plus*+ . . . the mark of superior equipment and services which have become the standard of comparison the world over.

**REPUBLIC NATIONAL BANK BUILDING • POST OFFICE BOX 718 • DALLAS 21, TEXAS**

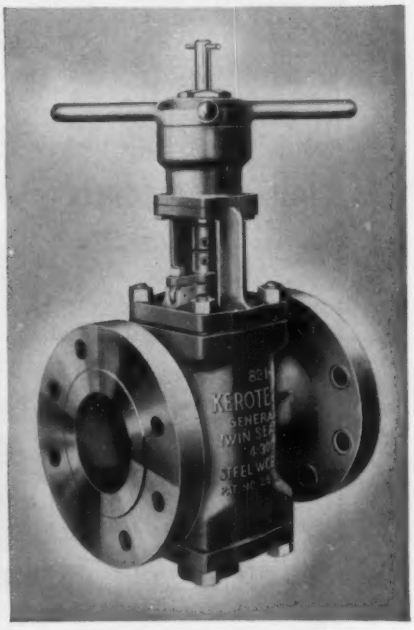
*Tomorrow's Progress Planned Today*

***Another new development using***

# B.F.Goodrich Chemical *raw materials*




*This Kerotest General Twin-Seal plug-type valve made by Kerotest Manufacturing Company, Pittsburgh, has two "slips" as seating surfaces with Hycar bonded to them. They are retracted when valve is opened, expanded when valve is closed to provide positive, vapor-tight seal. Hycar face slips are made and bonded by Castle Rubber Company of East Butler, Pa. B.F.Goodrich Chemical Company supplies the Hycar rubber material only.*



## Hycar makes valves seal vapor-tight

CARRYING and controlling hard-to-handle gases and chemicals calls for valves that seat securely. This new plug valve uses Hycar rings bonded to its "slips" to assure a vapor-tight shutoff.

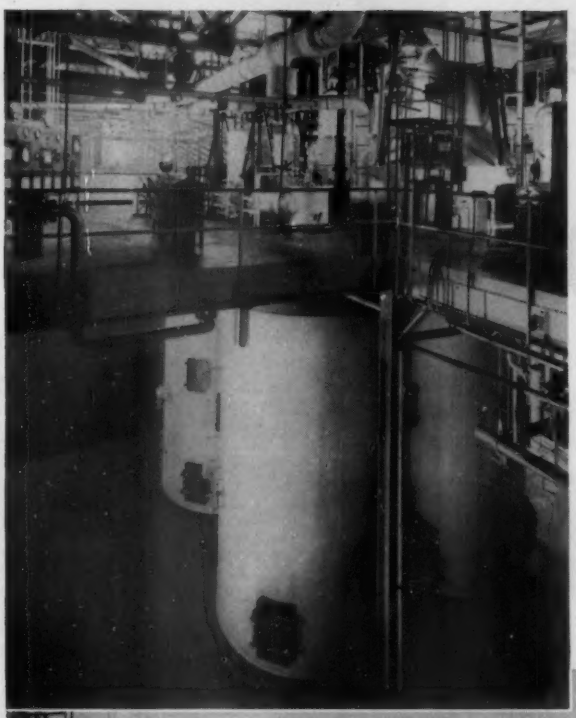
Hycar nitrile rubber is ideal in applications like this. Its outstanding resilience means that it can withstand repeated and severe mechanical deformation. Since it lives with hydrocarbons that would destroy other types of rubber, it can be used for natural gas, distillate, and sweet and sour crude oil. And it will stay flexible under temperature variations.

Hycar may be the material that will help you get more results out of your product. For technical information, write Dept. LM-3, B. F. Goodrich Chemical Company, 3135 Euclid Avenue, Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ontario.

**Hycar**
*American Rubber*
B.F.Goodrich Chemical Company
a division of The B.F.Goodrich Company

B.F.Goodrich

**GEON polyvinyl materials • HYCAR American rubber and latex • GOOD-RITE chemicals and plasticizers • HARMON colors**



# Meet peak load demands more economically with facilities designed by UNITED ENGINEERS

Comes a sudden temperature drop and peak loads start taxing your gas production equipment to the limit. To keep operating costs down, your facilities must be able to produce gas from the most practical source available.

Why not call in United Engineers and talk your problems over. You may prefer to supplement your present equipment with a dependable L.P. gas plant unit—or high Btu oil gas apparatus. Or perhaps the flexibility and high capacity of a U.G.I. Cyclic Catalytic Reforming (CCR) Process Unit may be exactly what you need. And if gas reserve storage is your problem, our experience and resources are available to help in developing facilities to meet the need.

Our background of 70 years in serving the gas industry can be advantageous to you in planning and installing facilities tailored to your needs. We invite you to share and profit from the skills and know-how that we have accumulated.

## UNITED ENGINEERS

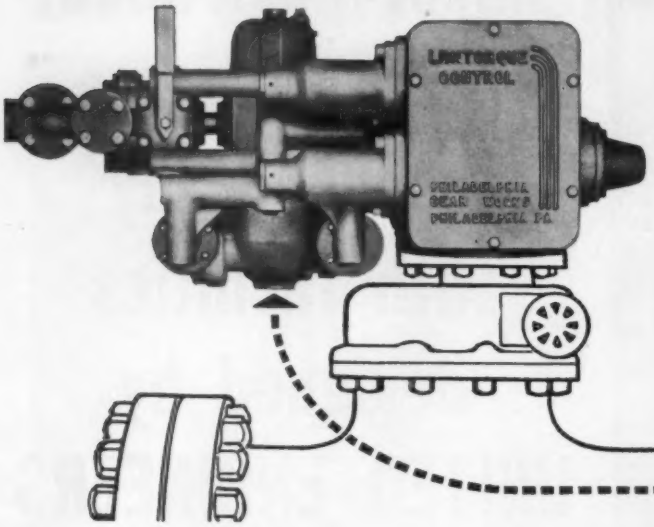
& Constructors Inc

U.E.&C. (Canada) Ltd.

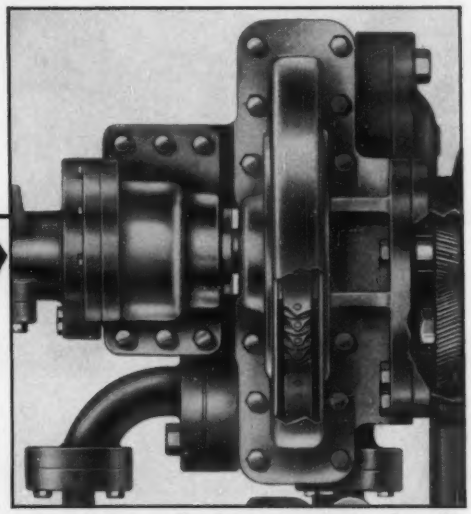
New York • PHILADELPHIA • Chicago

*Our list of clients includes many of the nation's forward-thinking industries and utilities*

# The *Only* True Turbine Design Valve Operator . . .



## LimiTorque (Type GAS)



*The above cut-away view shows the unique single wheel turbine construction*

## . . . for Natural Gas Pipeline Service

### *exclusive design features include:*

- **POSITIVE, SIMPLE OVERSPEED CONTROL**
- **ALL INTERNAL PARTS OF NON-CORROSIVE MATERIALS**

The type GAS valve operator offers an entirely new concept into automatic mechanical valve operation. Here is a motorized operator for plug and gate valves especially designed for natural gas pipeline service. The single wheel turbine develops high torque at rated speeds and is designed to operate on natural gas at unreduced inlet pressures up to 1200 psi. The gas turbine eliminates serious friction wear at vane tips and possibility of damage due to excessive motor speeds. Being a true turbine, with permanently lubricated bearings, no line oiler or any other lubrication means is required.

In some sizes of gate valves the LimiTorque type GAS operator is top mounted, eliminating the expense of valve bevel gearing. A declutching mechanism disconnects the motor, allowing a complete checkout of the entire system. The turbine can be run without moving the valve or disturbing limit valve settings.

All operators are readily adjustable to packaged automatic shutdown systems, solenoid control and manual control through the use of four way valves. Electrical switches can be provided for remote light indication.

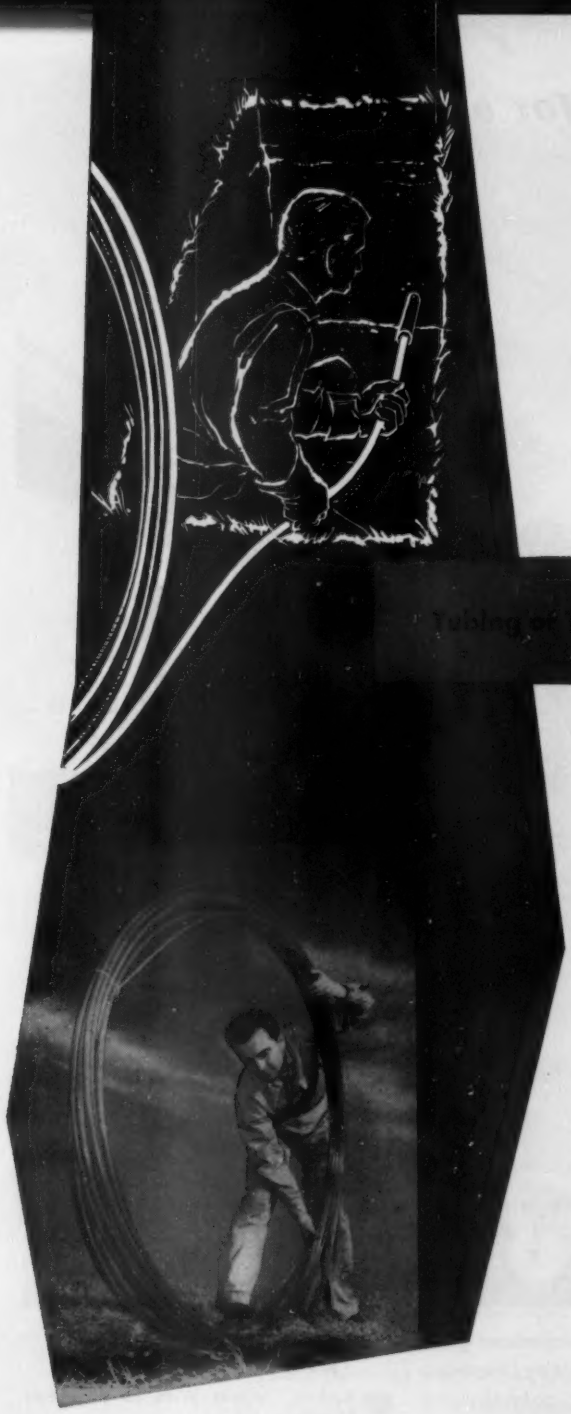
The new type GAS LimiTorque Valve Operator is completely self-contained: motor, control valves, gearing, and auxiliary hand wheel drive . . . all external piping, aside from a single connection to the gas source (and an exhaust, if desired) has been eliminated. . . . The type GAS LimiTorque Valve Control is a product over 30 years experience in the design and construction of mechanical valve operators. . . . *These Units provide dependable operation after extended shut-downs.*

**Send for 8-page Bulletin No. 7-57, which completely describes and illustrates this new type GAS Valve Control.**

**LimiTorque®**

*PHILADELPHIA GEAR WORKS, INC.*
ERIE AVE. & G STREET, PHILADELPHIA 34, PENNA.
Offices in all Principal Cities

**INDUSTRIAL GEARS & SPEED REDUCERS • LIMITORQUE VALVE CONTROLS • FLUID MIXERS • FLEXIBLE COUPLINGS**
Limitorque Corporation • Philadelphia



# Replace services without trenching

Plastic tubing of Tenite Butyrate makes natural gas service replacements easier—and more economical. This tubing eliminates the need for trenching—the most expensive operation in service replacements. Only two holes need be dug: one near the gas main tap, the other at the service riser. Tubing of Tenite Butyrate is then run through the corroded metal service line. Since plastic creates less friction than metal due to the smoothness of its walls, pressure is unaffected by the slight decrease in diameter of the service line. Easy-to-use adaptors make connections between tubing and metal pipe.

Installation time is further cut because tubing of Tenite Butyrate is easy to handle. It is so light in weight that an average service of 70 feet weighs less than four pounds.

The economy does not stop with installation, however. Tubing made of Tenite Butyrate withstands soil corrosion or electrolysis—so you are assured of many years of trouble-free service.

Since 1943, extensive field use has demonstrated the many advantages of Tenite Butyrate over metal for natural gas service. One company has already installed nearly 3,000,000 feet of Butyrate tubing—for both new and replacement service lines.

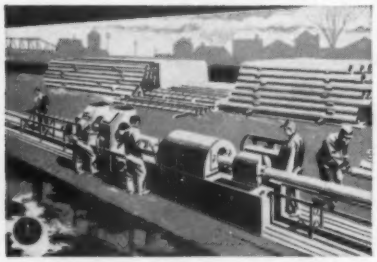
Discover how you can share in the benefits offered by this Eastman plastic. At your request we'll send more information about the tubing, fittings, and their installation, plus a list of suppliers in your area who handle tubing made of Tenite Butyrate. Write: EASTMAN CHEMICAL PRODUCTS, INC., subsidiary of Eastman Kodak Company, KINGSPORT, TENNESSEE.

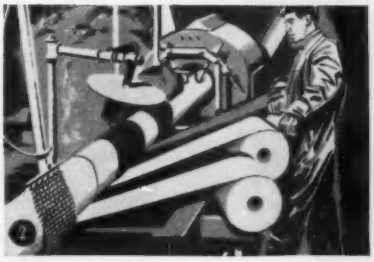
*A 16mm. sound-color film, "Plastic Pipelines," is available upon request.*

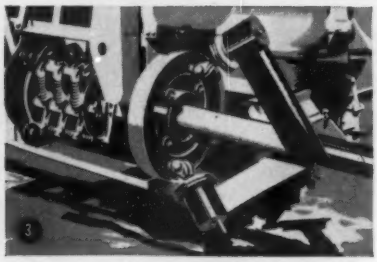
**TENITE**
**BUTYRATE**
*an Eastman plastic*

## no one coating is best for every job

## that's why Dearborn supplies all three




Varying circumstances, job conditions, and even budget limitations prohibit specifying one type of coating for every pipeline. That's why Dearborn offers you all three: asphalt coatings; wax-type coatings; polyethylene plastic tape. These superior coatings, together with the correct primers and wrappers, may be applied at the mill, railhead, by hand or Traveliner. Your local Dearborn representative can help you select the right coating combination for your specific job at lowest possible cost.

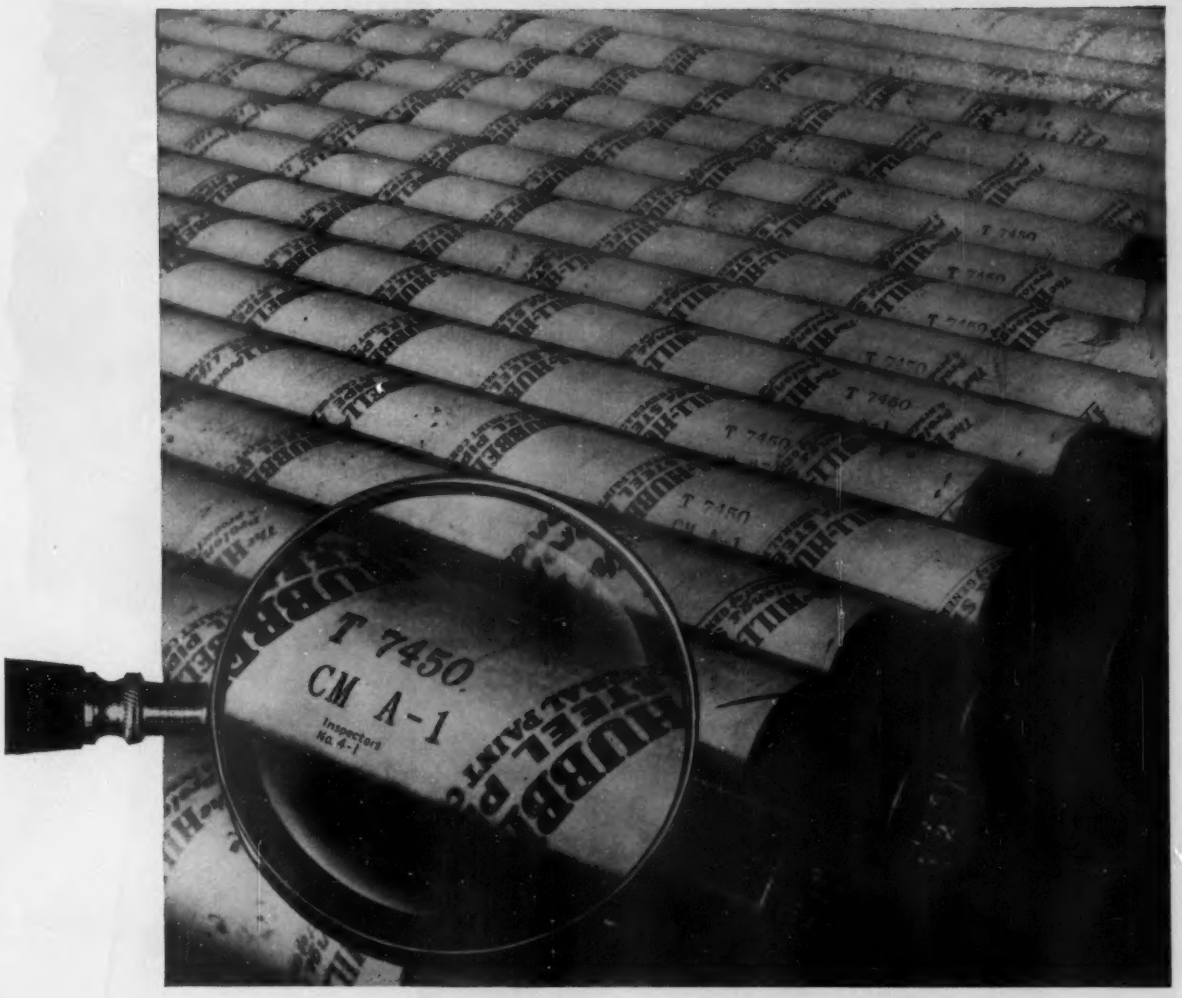
**CALL YOUR DEARBORN MAN OR WRITE FOR INFORMATION**

1. Asphalt Coatings. Write for your copy of Bulletin 3083-A.
2. Wax-Type Coatings. Write for your copy of Bulletin 3050.
3. F.O.S. SAFE-T-CLAD Polyethylene Plastic Tape. Write for Bulletin 3002.

**Dearborn® CHEMICAL COMPANY**

**MERCHANDISE MART PLAZA, CHICAGO 54, ILLINOIS**

WORLD'S MOST COMPLETE LINE OF PROTECTIVE MATERIALS FOR THE CONTROL OF CORROSION




# What? Autograph a piece of pipe?

Yes! The numbers stamped on Hill-Hubbell pipe wrapping are the job number, specification and signature of the man who inspected that pipe. When a Hill-Hubbell inspector signs a pipe he identifies the job and gives you his personal guarantee that the pipe is protected perfectly... permanently... to the ordered specifications.

Hill-Hubbell inspectors use modern electronic testing equipment to check every square inch of every pipe before it leaves the factory. In the field the stamp identifies the pipe as to job and specification. Hill-Hubbell inspectors have autographed pipe for 25 years... another "Quality-Control" first, pioneered by Hill-Hubbell.

**Specify Hill, Hubbell wrapped pipe on your next job**

# HILL·HUBBELL & COMPANY

FACTORY APPLICATORS OF COATINGS AND WRAPPINGS

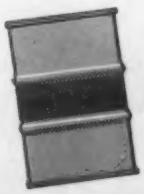
DIVISION OF GENERAL PAINT CORP. • 3001 MAYFIELD ROAD, CLEVELAND 18, OHIO

# 1. Odorization of Gas

The gas should carry sufficient odorant to give prompt warning of even minor leakage to any person with an average sense of smell. The quantity of odorant added should be sufficient to give prompt warning of leakage when the concentration of gas in the air is one-fifth of its lower explosive limit.

• From "A 14-Point Program for Safe Practice" by Mr. A. Meinke, Safety Director, Indemnity Insurance Co. of North America, Philadelphia, Pa.

This paper by Mr. Meinke appeared in GAS AGE, October 17, 1957.



**1st. for Safety**

**NATURAL GAS ODORIZING, INC.**

P. O. BOX 15252 / HOUSTON 20, TEXAS

# SIE Telemetering Systems bring automatic pipelining ANOTHER STEP NEARER

With the development of the TTR Telemetering System, SIE moves another major step forward toward the fully automatic pipe line.

TTR Telemetering Transceivers are the newest addition to the SIEMARC (SIE Monitoring and Remote Control) system. By receiving measurement data and trouble signals from remote units and returning necessary command signals, the TTR provides the vital automatic link between compressor stations and the dispatching office.

An unlimited number of functions may be carried on a single voice frequency channel. Unique modulation methods and coding techniques minimize random errors and make possible the use of low cost, readily available transmission facilities. Solid state circuitry and straightforward design assure system reliability and long service life.

Combined with SIE Compressor Start Units, Telemetering Transceivers allow immediate interrogation of remote functions and automatic verification of performance, and provide the dispatcher with continuous centralized monitoring and control.

If you are contemplating new pipe line construction or modernization of existing lines, *plan ahead toward the fully automatic pipe line* by installing these basic units now. Contact the SIE Control Division for full information.

SIE

**SOUTHWESTERN INDUSTRIAL ELECTRONICS COMPANY**

**2831 Post Oak Road • P. O. Box 13058 • Houston 19, Texas**

PRIME AND SUB-CONTRACTORS FOR MILITARY ELECTRONIC INSTRUMENTATION AND GROUND SUPPORT EQUIPMENT

## ANOTHER GREAT GAS RANGE FIRST FROM ROPER!

# TOP-OF-RANGE ROTISSERIE, VERTICAL BROILER AND GRIDDLE

*Revolutionary* ROPER

## Rotis-O-Grill

### Pulls More Prospects — Makes More Sales

Here's 4-way cooking convenience never before offered! "Rotis-O-Grill" twin burners provide instant heat, penetrating radiant heat. Clean and spatter-free barbecuing, broiling or grilling. "Thermo-Spit" meat thermometer ends guesswork. "Rotis-O-Grill" adds welcome extra capacity to the cooking top, too . . . does more jobs at once. Make your selling easier, more profitable . . . sell "Rotis-O-Grill."

WRITE TODAY FOR FULL INFORMATION

Cooks with Radiant Heat

"Thermo-Spit" Meat Thermometer

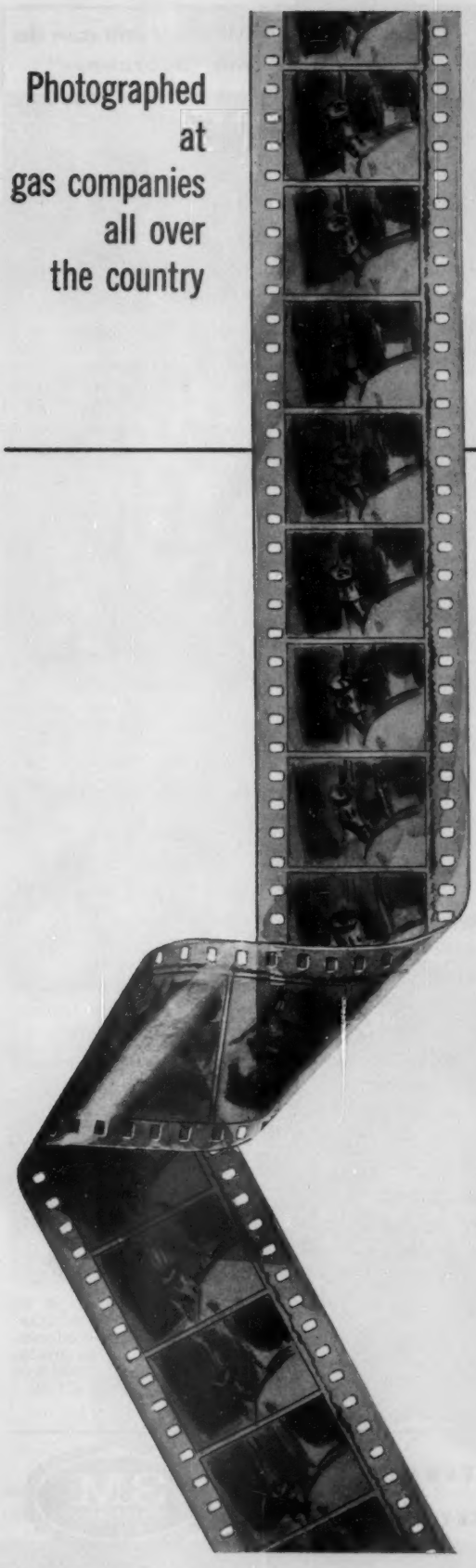
## ROPER

*"America's Finest GAS Range" . . . Now Finer than ever!*

GEO. D. ROPER CORP., KANKAKEE, ILLINOIS

**OTHER ROPER ADVANCES TO HELP YOU SELL:** "Tem-Trol" Automatic Top Burner • "Circle-Simmer" Speed Top Burner • King-size 20" Oven • "Insta-Matic" Oven Guardian • "Insta-Lite" Automatic Lighting

Photographed at gas companies all over the country



# "The Last Fifty-Feet"

*a 25-minute sound-color movie made for the men who install the final connecting lines which provide safe, dependable gas service all over America.*

In this new movie you will see on-the-job sequences of service line installations as practiced by leading gas companies all over the country. You'll see various standard practices for tapping the main . . . making up service lines . . . going through basement walls . . . setting meters and regulators . . . making renewals . . . handling emergency repairs.

In "The Last Fifty Feet," you may discover new ways to save time and money on service line work . . . new answers to problems you are running into. And you'll doubtless want your crews to see it too. So make arrangements now for an early showing at your own office . . . just call your Dresser Sales Engineer, or use the coupon below.

**DRESSER**
MANUFACTURING DIVISION

ONE OF THE DRESSER INDUSTRIES

**Bradford, Pennsylvania** • Chicago • Houston
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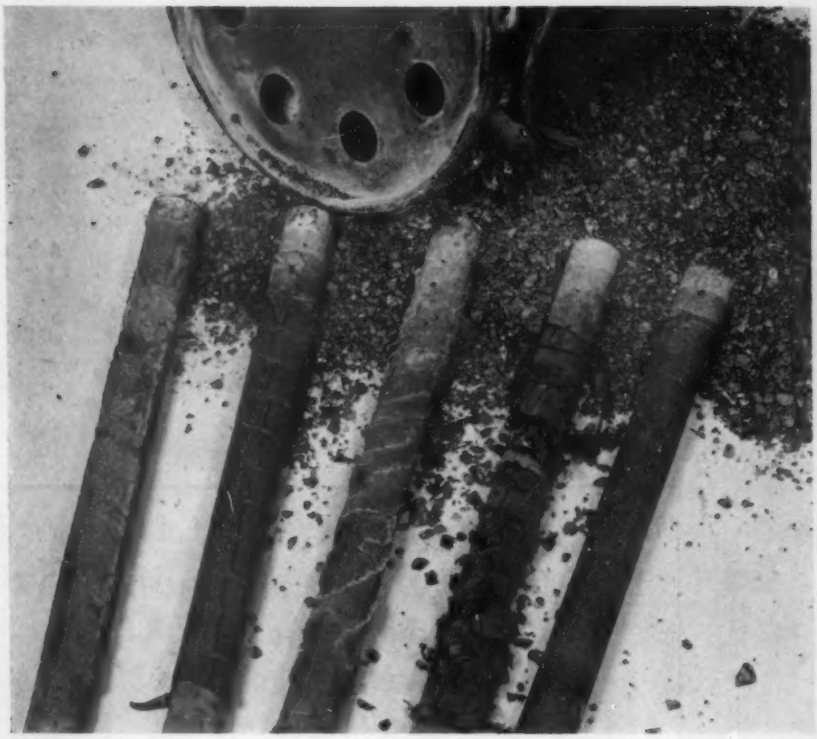
I'd like to see "The Last Fifty Feet" . . . call me to set up a date

Name_____
Title_____
Company_____
Address_____



# 200-hour torture test proves SCOTCHRAP superiority!

REG. U.S. PAT. OFF.
BRAND
PIPE PROTECTION TAPE

Each of these 5 standard pipe lengths was covered with a different commercial pipe "protective" coating—both tapes and mill-coatings. All five pipes were then put in the barrel shown with an abrasive-chip tumbling medium and continuously tumbled for 200 hours. This unretouched photo shows the results: only the pipe coating on the extreme right survived *intact*—the pipe wrapped in "SCOTCHRAP" Brand Pipe Protection Tape. This photo shows clearly and dramatically why "SCOTCHRAP" gives such superior performance in resisting abrasion from backfilling and underground soil stresses. Add to this the superior resistance to electrolytic forces . . . the superior shear adhesion strength . . . and the new low prices, and you have the reasons why we believe "SCOTCHRAP" Pipe Protection Tape is your best total coating buy for entire distribution systems.

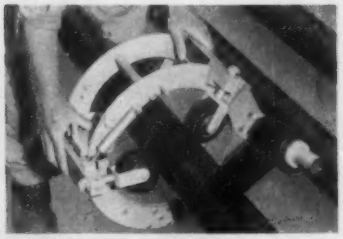
"SCOTCHRAP" is a registered trademark of 3M Co., St. Paul 6, Minn.

**"SCOTCHRAP" Pipe Protection Products**

**LOOK what you can do with "SCOTCHRAP"**

**MAKE QUICK,** easy applications to any size pipes. "SCOTCHRAP" is specially formulated polyvinylchloride in handy tape form. It is tough, but conformable; sticks at a touch . . . no heat . . . no mess!

**ACTUAL** field use shows why abrasion-resistance of "SCOTCHRAP" is important: backfill is coarse, rough—could easily puncture or tear less tough coatings.



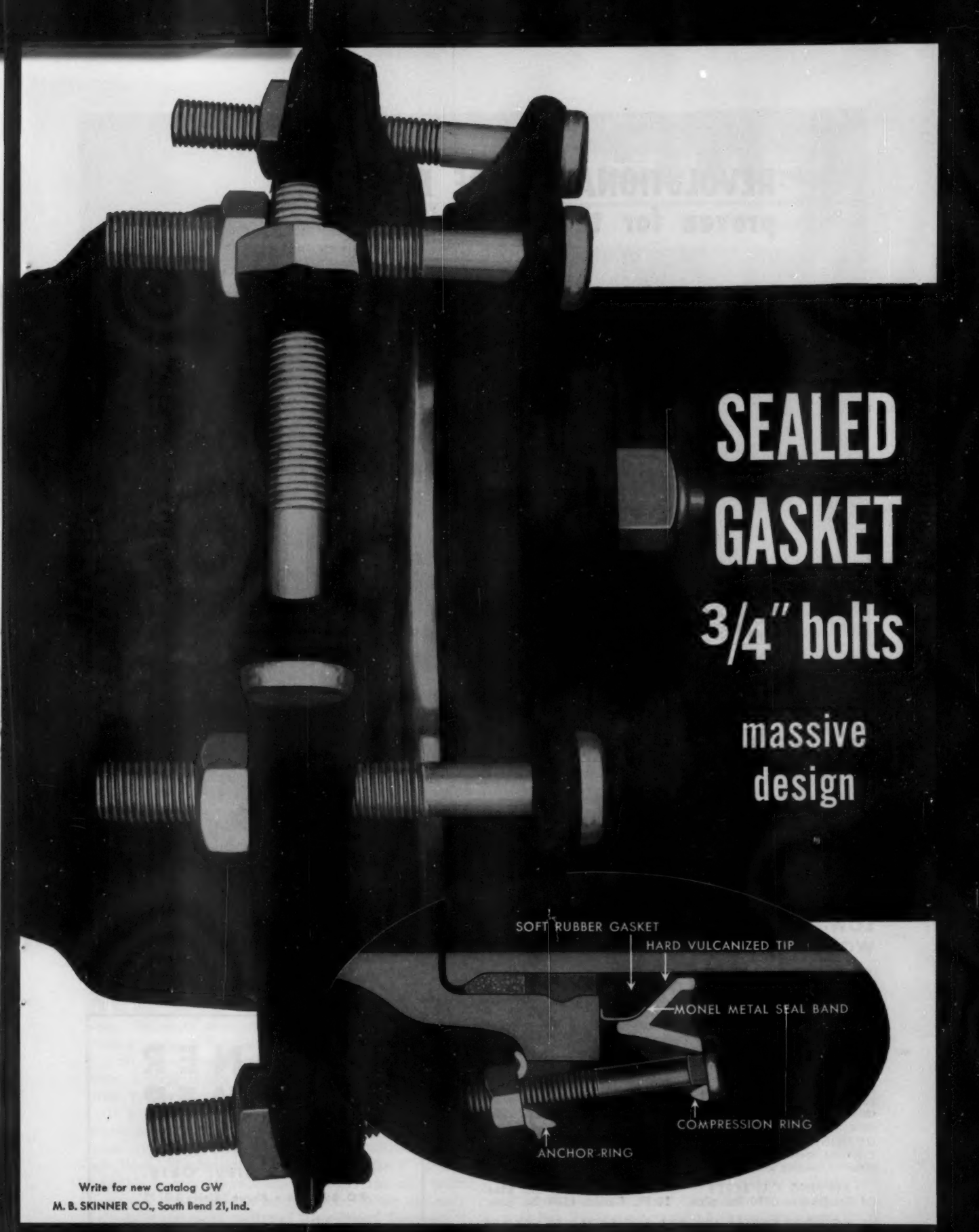
**SAVE TIME** on total system coverage. With wide-width "SCOTCHRAP" and "Betzel" Tapester, one man covers 200 feet of 4″ pipe in less than 30 minutes.

**INSULATE** joints, tees, elbows in the field. Supercomformable "SCOTCHRAP" does it quickly. For complete information on "SCOTCHRAP", or to arrange demonstration, write: 3M Co., 900 Bush Ave., St. Paul 6, Minn., Dept. CT-58.

**MINNESOTA MINING AND MANUFACTURING COMPANY**

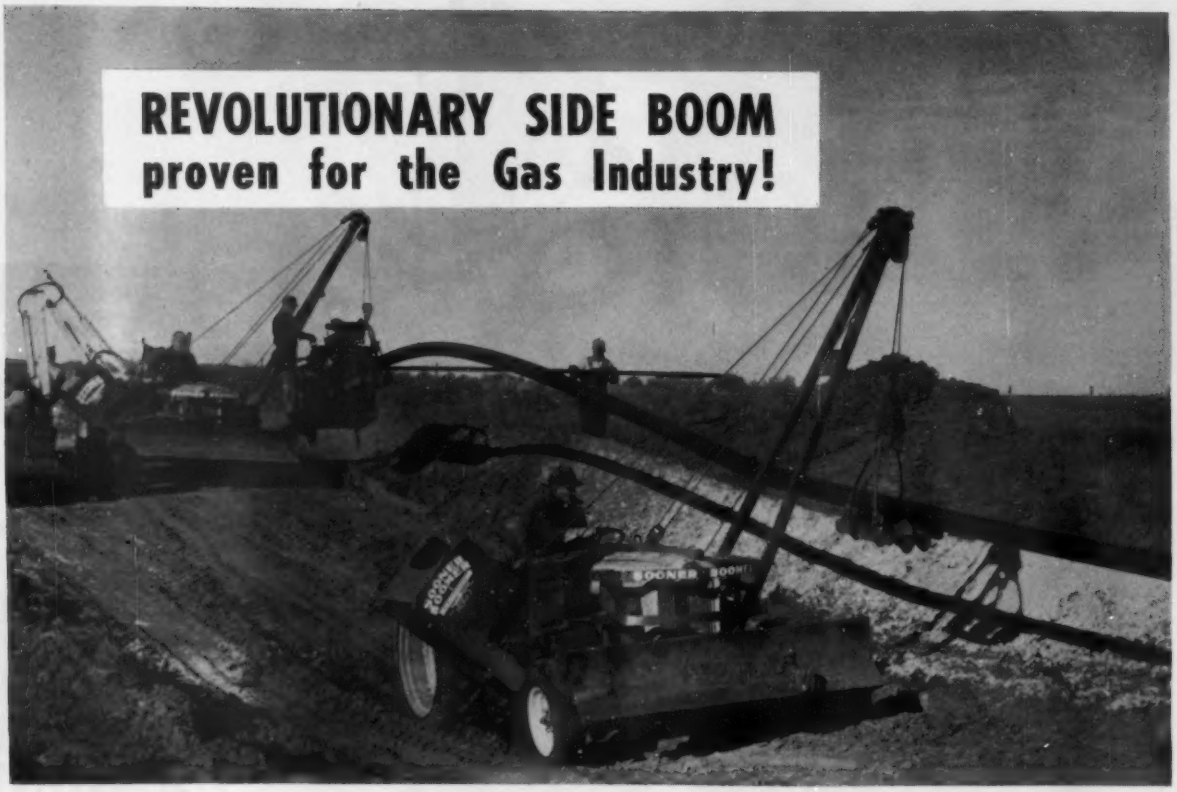
**. . . WHERE RESEARCH IS THE KEY TO TOMORROW**

3M COMPANY




Write for new Catalog GW
M. B. SKINNER CO., South Bend 21, Ind.

# SKINNER-SEAL BELL JOINT CLAMP




*The Only Side Boom On Rubber Tires!*

## Rubber Tire Mounted
# SOONER BOOMER
## Handles 10-in. Pipe!

### LOW-COST SOONER-BOOMER DOES THE WORK OF 2 CONVENTIONAL MACHINES!

The Sooner-Boomer is the world's first side boom mounted on rubber tires. Designed to handle 10" pipe, this revolutionary machine eliminates unnecessary right-of-way damage on city work—eliminates the need of pipe stringing along city streets ahead of ditch. A low center of gravity makes the Sooner-Boomer highly stable, loaded or unloaded. It operates at road speeds on back haul, and is equipped with a swamper platform. A 12-foot boom makes it possible to lower in over spoil. Power up and power down on all cables assures ultimate safety and precision line-up. The Sooner-Boomer easily lowers in or bends 8-inch pipe. Excellent performance on clean-up and ditch dressing. The Sooner-Boomer is designed to put all weight on wheels, eliminating any strain on engine, transmission and differential.

**OPTIONAL:** 7-foot angle dozer; rearend winch; 8 forward and 2 reverse speed transmission; trailer hitch; 3-pin connected, boom mounted bending shoe (available in 2, 4, 6 and 8" sizes).

**LIFTING CAPACITY**
**4 Ft. Radius 3750 lbs. plus — 8 Ft. Radius 2450 lbs. plus**
**10 Ft. Radius 1500 lbs. plus**

**USING FORD SERIES 600 AND SERIES 800 TRACTORS**

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GAS

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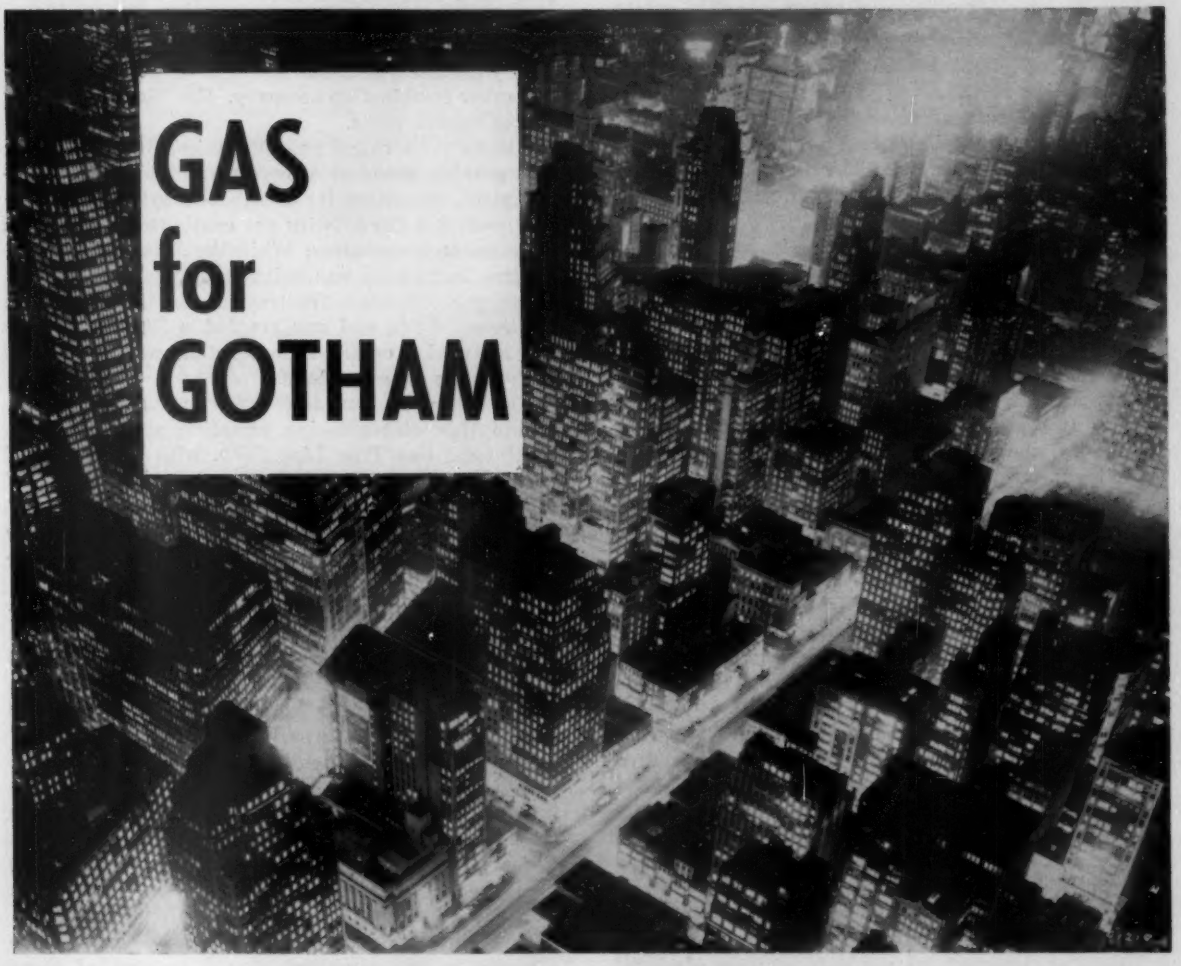


# GAS for GOTHAM

By WILLIAM W. CLARK, Eastern Editor

METROPOLITAN New York, that huge, sprawling, brawling community of ill-defined boundaries, which in some ways is more a state of mind than a place, is the City That Has Everything.

Everything that New Yorkers think counts, anyway. Though it has few trees and no mountains, to a New Yorker these are of little importance.

It has people in uncomfortable abundance—somewhere between 10 and 15 million, perhaps, depending upon where you wish to set up your mythical boundary lines. Manhattan alone has more than 8 million, yet this is only the nucleus. Actually the city spills out in all directions, for many miles. On the unsteady wheels of the much maligned Long Island Railroad, it runs out through Queens and Nassau and Suffolk counties and into the farming communities that dot the eastern reaches of the island. It curls a patronizing arm around Brooklyn, despite that obstreperous offspring's fierce, individualistic pride.

It laps over into Long Island, where, within sight of the towering Manhattan skyline, you can still get away from it all. It can lay a rightful claim to Westchester county and a southern strip of Connecticut, where thousands of Manhattan's daylight residents sleep. It stretches its fingers of influence across the Hudson river and deep into New Jersey, stopping just short of another great metropolitan hub, Philadelphia.

It has the finest homes and the worst slums. It is

the center of high fashion and the harbor of derelicts. It's fabulous, glamorous, romantic, dirty, and pestilential. It has a fascination that simultaneously attracts and repels.

It has the nation's fastest transportation system and the world's worst traffic snarls. It has the latest conveniences and it has cold water flats.

Here people accept things. They close their eyes to the dirt in the subways. They haul their own ashes with an air of unruffled resignation. They cook on hot plates and light top burners with a match, and think nothing of it.

This is the sort of place that natural gas found when it made its debut seven years ago. It found apathy in large doses, skepticism almost universally, and deep distrust in some quarters. It had to make its own way.

Through the succeeding years, it has gained a strong foothold in this fabulous city. It has worked quietly to mold an important and far reaching change in the way of life of the Metropolitan New Yorker that is on the surface largely unnoticed. Taking over a minor role played by its predecessor, manufactured gas, it has risen to stardom in the field of energy supply. It has brought new comfort and convenience to millions, and new prosperity to the companies that serve them.

But let's be specific. Just what *has* natural gas actually meant to New York?

Picture the situation as it existed in 1950, just before natural gas arrived. Here was the richest market in the nation—richest in population, in commerce, and in industry, the financial capital of the world. It was served by a half a dozen gas companies, more or less—depending upon what area you include within its boundaries.

There were two combination companies—Consolidated Edison Co. of New York, serving the island of Manhattan and Westchester county; and Long Island Lighting Co., serving virtually all of the huge island.

Among the straight gas companies, Brooklyn Union Gas Co. was the undisputed leader. Brooklyn Borough Gas and Kings County Lighting had their own tight little corners. Staten Island was supplied by New York & Richmond Gas Co.

The total combined gas sendouts of these six companies would have hardly been considered a respectable day's business for one of the gas giants in the Southwest, West, or Midwest. Each was perking along with a manufactured gas of low heat content—mostly in the 537-Btu range. Their mains were old and ill-adapted to the addition of any really substantial loads through pressure elevation. Gas for househeating had never been truly competitive with other fuels because of price. Even though the price of oil and coal had shot up to a point where they could begin to compete, neither the systems nor the production facilities were capable of doing very much about it.

Too, they were hampered by the peculiarities of the market. The Consolidated Edison service area is the extreme example of this. Nearly three-quarters of the area's population of 8.8 million live in apartments. The utility services for many of these customers is included in the rent. The landlord furnishes the hot water and a gas range. Heating is usually supplied from a central furnace; water is frequently heated in a furnace coil.

What can a utility sell in such a market? The landlord is the buyer, and he is interested in the cheapest, not necessarily the best. Any recital of the obvious advantages of gas for space heating usually falls on deaf ears. Therefore, at Consolidated Edison, gas was always a second stringer.

To a lesser extent—lesser because theirs was a more nearly normal type of market—the same was true with the other combination company. Gas played a heavily muted second fiddle.

Among the straight gas companies, Brooklyn Union was pushing ahead at a more respectable rate, building plant, expanding its distribution system and adding load. But the 537-Btu gas continued to act like a governor on its progress. While the demand for househeating in its area was building up pressure, the net result was only more frustration. In 1946, Brooklyn Union asked for, and was granted, a PUC househeating restriction order—an order that was to be kept in force for almost a decade.

The other gas companies were in similar straits.

Into this disheartening situation stepped Transcontinental Gas Pipe Line Corp. with a promise of natural gas from far-off Texas. The 1800 miles of pipeline required to link the supply to the market would form the longest pipeline supply system in the nation. And natural gas promised three distinct advantages:

First, Btu for Btu, it was cheaper than manufactured gas.

Second, it obviated the necessity of building additional manufacturing facilities at high cost.

Third, because of its high thermal value it would nearly double system capacity, permitting a large increase in sendout without any additions to distribution facilities.

The New York utilities were susceptible to its charms. On Jan. 17, 1951, a valve was opened in a metering station at 134th St. in Manhattan, signaling the invasion of natural gas into the New York markets.

The initial volumes—125 MMcf/day—hardly made a ripple in the combined supply systems of these various utilities. But it wasn't long before supplies began building up in large increments.

In 1952, a second line was run into the area from Transco's eastern terminal at Linden, N. J. This tube snaked across Staten Island, to the south of Manhattan, dipped under the "Narrows," and emerged in Brooklyn. Its capacity was sufficient to serve the entire needs of the New York area. Added to the 134th St. crossing, it gave the area east of the Hudson 251 MMcf/day.

In 1954, Transco continued its building program, adding more loops and boosting system capacity by 130 MMcf/day. More significantly, the company had arranged to use a part of the Oakford storage field in western Pennsylvania, which was owned and operated by Texas Eastern Transmission Corp. Although still several hundred miles from New York City, Oakford was a long jump from the original sources of supply in

the Southwest. It was destined to make possible the building of the Gotham's star load—househeating.

There was yet plenty of room for growth in natural gas usage. Taking a close look at its principal market, lying along the New York to Philadelphia axis, Transco in that year came up with the following figures on potential:

Market population: 17 million.

Number of services: 4,775,000. (A number of meters serve multiple dwellings.)

Number of services supplied with mixed or manufactured gas: 2,841,000.

This latter number now became Transco's primary target. To snare it, increased gas supplies plus better assurances of dependability were needed. In succeeding years, Transco has continued to build new facilities, add capacity, and peg away at its target. More widespread conversions have followed on an accelerated, yet orderly basis. Brooklyn Union has long since completed its one-fell-swoop changeover. Working by sections, Con Edison has now converted all its customers' appliances. Kings County Lighting and Staten Island (recently combined with Brooklyn Union) are now on straight natural.

Long Island Lighting is still in the process. Each year it attacks massive blocks in the manufactured gas service areas and cuts them over to natural gas.

And there are still many exciting plans in the works.

Service areas of the distribution companies serving greater New York.

# Consolidated Edison Co. of New York, Inc.

Main construction isn't always easy in Manhattan. Here a main is by-passed over subway construction in Lincoln Square (65th St. and Broadway). Subway station was enlarged to handle bigger trains, hence main had to be re-located.

In a number of ways, the gas operations of Consolidated Edison Co. of New York, Inc., provide an interesting contrast to those of Brooklyn Union.

For one thing, Con Edison is a combination company, so it has an inherent flexibility in its load pattern that a straight gas company cannot quite match.

Con Edison also has a more varied type of market than Brooklyn Union. There is, on the one hand, the tight island of Manhattan, but up to the north lies Westchester county, which still has its wide open spaces. In Manhattan there are extremes of wealth and poverty, but Westchester is pretty much an upper-class area. All things considered, Westchester provided a much more ready market for natural gas expansion.

When natural gas first arrived, it was fed into the company's manufacturing facilities. During that first summer, all of its customers' services in Westchester as well as a small number in the Bronx and Queens were converted to natural gas. The rest of Queens, the Bronx and Manhattan followed in that order. It took from July 1951 to July 1956 to complete the job, most of it being done by Con Edison manpower.

Oil gas facilities at two of the company's gas manufacturing plants have been retired. Today the company's two plants at Astoria and at Hunts Point can produce between them up to 112 MMcf per day of high-Btu oil gas if needed. At Pelham, where oil gas facilities were retired just a few months ago, the company has LP-gas-air making facilities with a capacity of 9.3 MMcf.

Despite the slower pace of the conversion program, Con Edison's send-out has increased impressively each year. In the winter of 1949-50, the last full year without natural gas, the peak was 165 MMcf of manufactured gas, corrected to a 1055-Btu basis. Peak system capacity at that time was about 189 MMcf.

Today, the company can fire up all its equipment

and send out more than 320 million. But this hasn't been necessary. The peak to date has been 274.5 MMcf at a 7°F average temperature.

In building the load to use this gas, Con Edison has brought its biggest guns to bear on the house-heating market. And with telling effect. In 1950, residential heating used only 6.8 billion cu ft of gas. In 1956, it accounted for almost 11 billion. Over these same years, general sales (which includes commercial space-heating) rose from 12.7 billion to 16.1 billion—an impressive but less spectacular increase.

Records for the year 1956 show how large house-heating is now bulking in the company's sales activities. Sales for other residential uses were up only 1.2 per cent in that year, but residential heating use soared 21.1. Con Edison has grabbed a lion's share of the new construction market for this usage.

For the foreseeable future, Con Edison will continue to place the emphasis on space heating. This load is expected to add to the system peaks at a rate of about 25 MMcf per day each year for the next five years, at least. By the winter of 1962-3, at this rate, about 125 MMcf per day will be needed. This increment alone is not too far below the entire peak day sendout in the last year before natural gas arrived.

Both Con Ed and Brooklyn Union are getting an unintentional assist from the city government, which has taken steps to eliminate an old New York institution, the "cold water flat." These sub-standard multiple-family dwellings have never had central heating. A new ordinance recently passed now requires landlords to install heating facilities. By the end of this year, all such dwellings having 10 or more units must provide such heating by law. By November 1959, all multiple family structures having less than 10 units must comply.

For Brooklyn Union alone, this opens up a market of 24,000 buildings. In Con Edison's territory, the total is several times this figure.

Con Edison's central dispatching offices are just a small stone's throw away from the U. N. Building at the east end of 42nd Street.

Con Edison is well situated to get gas from a number of sources. Transco gas feeding in from Linden at the Narrows and at 134th St. goes into a common "header" known as the New York Facilities line, which supplies the New York and Long Island companies. Through it, they can also "trade" gas around by displacement.

Con Edison gets gas from Tennessee Gas Transmission Co. at the northern end of this line, at White Plains, in Westchester county. This location is strategically important. First, if there was a failure at one of the other sources, Transco gas might conceivably be re-routed north to Rivervale and fed into its connection with Tennessee Gas, whence it could be transported to the White Plains intercon-

Natural gas from the Southwest feeds into New York via the Transco system at the 134th St. Station shown here.

Con Edison had to expand its system to handle natural gas. As you can see here, laying mains in Manhattan sometimes required some squeezing.

nection with the Facilities line. Secondly, it's always sound design to have feeders at opposite ends of a system.

The company also has interconnections with Algonquin Gas in Westchester county, and these are even farther north, near Peekskill. If conditions warrant, Con Edison can take up to 10 MMcf of emergency gas.

Let's look in on Con Edison's dispatching center on a cold winter morning. Bill Larsen, chief gas dispatcher, has reported in. At hand are the complete weather reports from the U. S. Weather Bureau, which come in by teletype at 10 p.m., 6 a.m., 11 a.m., and 4 p.m. These give Larsen a picture of the weather for the day and the next, but he and his dispatchers keep a close watch on hourly reports to stay abreast of changing conditions. The teletype continues to clatter intermittently—supplementary reports are frequent.

On hand also are the dispatchers' log sheet of various descriptions.

Larsen assembles his sources of information and goes to work on the day's dispatching plan for drawing and distributing gas over the period from 8 a.m. to 8 a.m. the next day.

He has numerous "banks" upon which he can draw. There is, first of all, the 143.7 MMcf of firm gas from Transco. Then there's an additional 25.6 MMcf firm from Tennessee Gas Transmission system. Con Edison is presently getting 30 MMcf of limited temporary firm from Transco, and 2 MMcf WPS.

All told, this gives Con Edison 201.3 MMcf to see its customers through the day. But will this be enough? Or will it be too much?

At 9 a.m., routinely, Larsen calls Transco's John Coker, senior dispatcher at Linden. If it appears that supply will exceed demand, he can cut out WPS.

Con Edison can also use gas as fuel in a steam boiler and make electricity with the gas it can't use otherwise.

Here's an interesting twist: As we have seen, through the medium of interchanges up and down the line, the gas requirements of utilities up and down the 1800 miles of line, and even up into New England, can be equated. The flexibility provided by many sources of supply as well as many distributing media enables the utilities to meet hourly demands of rather wide variance. As a result, what one company can spare may be indirectly made available to another company hundreds of miles away.

If expected demand exceeds supply for tomorrow's load, Larsen must keep a close tab on the vagaries of the weather. A drop of 1° can bring a demand increase of approximately 3.5 million ft. Stiff winds can add as much as 10 million more load.

On an hour-to-hour basis, these dipsy doos can be smoothed out by pulling from holder stock. Con Edison has 32.2 MMcf in low pressure storage holders at the Astoria and Hunts Point stations. Automatically controlled boosters at these points can pull from storage more than 6 MMcf per hour. Additional high pressure storage is still maintained at the ends of the system.

This leveling action is helpful in enabling Con Edison to end up each day within little more than a whisker of its contracted demand.

Ordinarily, such operations as these are all that are needed to satisfy demand. But, if needed, Con Edison has some more weights it can toss onto the scales to bring supply and demand into balance.

The first of these is the Astoria plant, which makes high-Btu oil gas. Skeleton crews man this plant around the clock, and a few sets are fired up and at the ready all through the height of the winter season.

When the call goes out for a gas make, things begin to happen throughout the entire company. Men who were once the backbone of the gas manufacturing operations, but who have since been shifted into other jobs in other departments, are given a rush call. By foot, company car, subway, and taxicab they converge on Astoria. Quickly they slip into their old and still-accustomed roles of gas makers.

If it should appear that even this source of gas will fall short of meeting the demand, other crews can be dispatched to the Hunts Point plant.

As a last resort, Con Edison can turn to LPG-air. One hundred thousand gallons of storage is maintained at Pelham in Westchester county. From this source the company could draw up to 9.3 MMcf per day.

The two oil gas plants have a peak capacity of 112 MMcf.

From all sources, then, Con Edison could draw more than 320 MMcf, if needed. To date, however, it hasn't been needed. Peak day at this writing was 274.5 MMcf on a day with 7° average temperature. Con Edison's system is designed for a 0° a day, which is a one-every-12 or 15-year rarity.

# Brooklyn Union Gas Co.

BROOKLYN Union Gas Co. serves a famous part of Gotham—perhaps the most widely known segment. However, Brooklyn is as important to New York City's life as its name is famous. The Brooklyn Union Gas Co. is even more so as its service area has spread well beyond fabled Brooklyn.

An important expansion of Brooklyn Union's service area took place on Jan. 15, 1957 when a consolidation became effective. This event consolidated Kings County Lighting Co., and New York & Richmond Gas Co. into Brooklyn Union. This was the result of many years effort on the part of BU to secure an area which would provide an extensive growth pattern.

The former Kings County Lighting Co.—now known as the Bay Ridge territory of Brooklyn Union—supplied gas to that section of Brooklyn generally known as Bay Ridge. It is a residential area. The population is over 400,000 and there are over 120,000 meters served in the territory.

The area served by the former New York & Richmond Gas Co. is the borough of Richmond, better known as Staten Island. This territory differs from that of the other areas of the consolidated company in that the expansion potentials are closely related to the development of large tracts which are available for homes and industry.

Brooklyn Union's first contract for natural gas, originated in 1950, called for 60 MMcf/daily. Since that time, the constant growth in customer demand has made necessary new contracts with suppliers to provide additional quantities of natural gas. Thus, the total daily supply of natural gas under contract became 191,127 Mcf, as of Dec. 31, 1957.

Growth such as this reflects success in expanding the gas uses of Brooklyn Union customers, especially for space heating. For example, 1957 was a record year for sales of heating equipment, both for home and industry. A total of 16,800 new heating installations was added to the company's lines during that year. This compares with the 12,700 gas-fired heating installations connected during 1956, the previous all-time high.

Other important highlights of 1957 that reflect the expansion of the Brooklyn company and its operations since natural gas was introduced into the system are:

(1) Earnings were the highest in history.

(2) Customers benefited from rate reductions (not the first for this company).

Purge burner in Williamsburg section of Brooklyn signals start of conversion in 1952. Similar burners were located at 57 points in the district.

(3) Construction outlays were the highest in years.

(4) Operations of Kings County, and New York & Richmond were merged into Brooklyn Union.

As a means of improving load factor, Brooklyn Union sells natural gas under special conditions to large industrial customers at attractive rates. This gas is delivered subject to interruption. The volume delivered on this basis was increased during 1957 by 1396 MMcf, or 14.4 per cent.

Thus, while the company has emphasized the house-heating market as a source of load growth, it has not neglected the importance of maintaining the base load, the commercial and industrial market, or the potential market for growth in other utilizations.

As of Dec. 31, 1957, Brooklyn Union's natural gas supply under contract looked like this:

| | |
|---|---|
| FIRM GAS | |
| Transcontinental Gas Pipe Line Corp. | 118,938 Mcf |
| Tennessee Gas Transmission Co. | 20,442 Mcf |
| Texas Eastern Transmission Corp. | 7,796 Mcf |
| STORAGE GAS (Winter Season) | |
| Transcontinental Gas Pipe Line Corp. | 22,487 Mcf |
| Tennessee Gas Transmission Co. | 20,442 Mcf |
| TEMPORARY GAS (Minimum Available) | |
| Transcontinental Gas Pipe Line Corp. | 1,022 Mcf |
| TOTAL DAILY SUPPLY UNDER CONTRACT | 191,127 Mcf |

The daily total natural gas supply reflects an increase of about 31 MMcf over 1956. Combined with a manufactured gas capacity of 119 MMcf,, Brooklyn Union makes available a daily total of 310,127 Mcf of gas during the heating season.

The load growth in recent years and the expectancy of its continuation for some time in the future make it essential that supplies of natural gas be further increased. Plans are underway to add 30 Mcf/day firm supply beginning in November 1958, and another 40 Mcf/day of storage gas beginning in November 1959. Still greater volumes of natural gas will be required in the future, and Brooklyn Union's management is confident the sufficient volumes will be available to meet the demand when needed.

Where will this load development come from? Let's take a look at Brooklyn and Queens. Here, Brooklyn Union plans to continue its emphasis on the intensive development of the market, particularly in house heating.

Then, in December 1955, a New York City law requiring central heating of all multiple family dwellings went into effect. Provisions of the law require compliance by November 1958 in the case of structures containing more than 10 dwelling units and by November 1959 for those containing 10 or less dwelling units.

In effect, the law provides for elimination of the so-called "cold water flat" in New York City. Brooklyn Union has been working with owners of these structures to offer all help and aid in acquainting them with the law and the advantages of gas heat. Through a program including a "landlords' bureau," every effort is being made to aid conversion to central heating installations. Estimates show there were about 24,000 cold water flat structures in Brooklyn Union's service area when the law went into effect.

Firm gas sales to commercial and industrial consumers continue to lean toward the increase side. The company also expects the pattern in off-peak sales to continue during the coming years.

Bay Ridge is primarily residential, so load growth there is predicated on the sale of gas heating installations. The company estimates that the subsequent five-year-period starting Jan. 1, 1957 may be expected to produce 8000 heating installation additions to its distribution system.

The outlook for growth in the Staten Island area is somewhat different. In addition to the growth characterized in Brooklyn, Queens and Bay Ridge, which is also expected for Staten Island, there is the important extensive growth possibility among both existing homes not now connected for gas and new construction anticipated on the large tracts of vacant land. And Staten Island's ideal location and good port facilities, suggest that it has excellent prospects for industrial development.

Brooklyn Union increased its net utility plant by $6.4 million during 1957 to bring more and still better gas service to its consolidated territory. The major part of this increase was used in a programmed strengthening and extension of the distribution system. The excess capacity of the system obtained from the conversion to natural gas from the Southwest has been utilized through added load.

One of the large construction projects completed in '57 was the new 17-mile main from Transco's Narrows crossing to the Nassau county line. This $6.2 million line is 24- to 26-in. OD and will supply gas to the southern part of Queens as well as to the neighboring Long Island Lighting Co. The first of several remote-controlled city gate stations went into operation on this line.

This gate station is housed in two small buildings in South Ozone Park, in the heart of one area of growth. These buildings are in a residential neighborhood, but before summer sets in the 100-by-200-ft plot will appear to be a well landscaped park.

This is the Van Wyck gate station, forerunner of a number of such stations Brooklyn Union will soon be operating. It is this company's first remotely operated station. All functions are completely automatic and a flow of gas sufficient to supply 50,000 househeating customers is entirely controlled from a dispatcher's office about 10 miles away.

A single control panel enables the dispatcher to operate the station at the remote location. Each of the many functions is coded on a "telephone"-type dial. The dispatcher dials a channel over which he can control a particular operation. Use of this system permits 21 separate functions to be operated or monitored over a single pair of telephone lines.

Natural gas flowing into the station at high pressure is odorized, reduced in pressure, metered, and humidified before entering the distribution mains. At each stage complete data and control is maintained at the dispatching center.

Brooklyn Union expects to complete a second remote-controlled station—in the Canarsie area—during 1958.

# Long Island Lighting Co.

Long Island Lighting officials marked the initial purging of manufactured gas with a ceremony on June 12, 1952. Edward F. Barrett, then LILCo's board chairman and now a director, started the purging operation. Watching at left is Errol W. Doebler, then president, and present LILCo's board chairman.

FOR 115 miles out into the Atlantic Ocean, starting from the eastern border of New York City's Borough of Queens, lies Long Island proper, aptly nicknamed "the Sunrise Homeland." Here dwell, in the counties of Nassau and Suffolk, 1,758,311 persons, 77,000 of whom regularly ride, on the average of five days a week, the nation's fastest commuter railroad, the Long Island RR.

Long Island is a stretch of land whose outline forms the shape of a huge fish, an apt form for a land that was once renowned as the greatest whaling center in the world. Today it has a variety of faces. There are immense suburban areas, one touching upon another. Each has its individual characteristics, name, and history. Farther out east, living becomes more rural. Small farms abound. Here the wealthy and well-to-do have their summer homes. There are hills, flatlands, picturesque streams, and hundreds of inlets peopled with an endless array of small and large boats of every description.

Historically, electricity has been the only form of energy that seemed to maintain a well defined market in this setting. The other fuels have had to compete for what was left. Oil, coal, LPG, and gas all had their share of the market for heating and other basic uses. But since natural gas came in, this fuel had begun to move out well ahead of the rest.

Long Island Lighting Co.'s market pattern illus-

trates the sort of condition that has prevailed. LILCo serves 527,680 electric customers, and 303,952 gas customers. Yet its electric service area is smaller than its gas market area, geographically speaking.

Gas saturation has been modest. But as in all other areas where natural gas comes in, things are changing for the better. The trend to natural gas is gathering momentum as it rolls along.

LILCo received its natural gas along with the other New York companies in January 1951. But like its fellow company in Manhattan, Long Island was slow to make a complete conversion; in fact, the changeover is still not finished.

When natural gas arrived, Long Island Lighting was distributing 537 Btu carburetted water gas and maintaining three carburetted water gas plants; for peak shaving purposes, three LPG-air plants at Inwood, Hempstead, and West Babylon, and one catalytic reforming LPG plant at Riverhead.

Since 1951, a gradual change has taken place. Customer appliances have been converted in selective areas, progressively. The first conversions were in the more sparsely settled areas, away from the production centers. By 1953, 93 per cent of the area had been changed over, but only 52 per cent of the company's total gas customers lived in this sector. Conversion will be totally completed this summer.

Like Con Edison, Long Island Lighting has been able to divert natural gas into its steam boilers to generate power at times when supply outran need. With this measure of flexibility, the company could maintain a 100 per cent load factor on its natural gas purchases and thus maintain an enviable position cost-wise for firm natural gas purchases.

Nonetheless, that pace has been steadily increasing. In 1950-51, for example, the peak day was only 29,003 Mcf, and for the year total sendout was 5956 MMcf. Two years later, peak-day sendout was up to 32,350 Mcf and the annual sendout was 6712 MMcf. In succeeding years, the peak day has jumped in successive increments of approximately 5, 3.8, 12, .6, 15.8, and 13.4 MMcf. Annual take has increased correspondingly with spurts of .5, 1, 1.2, 1.2, and 1.2 billion. This record was achieved despite unseasonably warm weather—until 1958.

Currently, the increase in sendout is running about 23 per cent over last year under the same temperature conditions. Over the next several years, an increase of approximately 25 MMcf per peak day per year, at 0°, is forecast.

While converting gradually on the one hand, LILCo has been building loads on the other. Househeating has been the start of the show, with 3148 sales in 1954, 6725 in 1956, and 10,072 last year. This year's sales quota will make all these look pale by comparison.

By way of contrast, here's a figure of interest. Before natural gas came on the scene, LILCo had about 12,112 heating installations—hardly more, in other words, than total sales for last year.

LILCo's merchandising policy is built around plumber-dealers, who sell gas space heating and water heating, and appliance dealers who sell other types of gas and electric appliances. But the company has continued to merchandise gas ranges until just recently. In March the decision was made to withdraw from merchandising of all kinds, both gas and electric. After June 30, LILCo will depend entirely upon its dealers to carry the ball.

Today, high-Btu gas is closing-in on the remaining manufactured gas segments of the LIL market. One hundred twelve thousand meters will be converted this year to complete the conversion program. These are the close-in areas—southwestern Nassau county and the Fifth Ward of Queens—Rockaway Peninsula.

The company gets its gas through two mainlines, which take off from the New York Facilities system. The older of these is the northern take-off, which delivers gas at Glenwood, on Long Island Sound. Recently a second line was completed, which takes off at the southern end of the facilities line in Brooklyn and hooks into the system not far from headquarters in Mineola.

Dispatching is now done centrally at the terminus of the new line. All key pressure points in Nassau county are telemetered in to this office, and the company is expanding its telemetering of key points in Suffolk county (to the east). All high pressure storage is operated automatically by pressure control.

Although LILCo uses underground storage in the Hebron field, peak shaving plants are still used and will continue to be used to augment supply. High-Btu oil gas and catalytically reformed propane will continue to be used. When the conversion is completed, low-Btu carburetted water gas will be passe. ■

For the story of how natural gas is transported from the Southwest to New York City, please turn to the Pipeline Section, beginning on page 123.

GAS exclusive

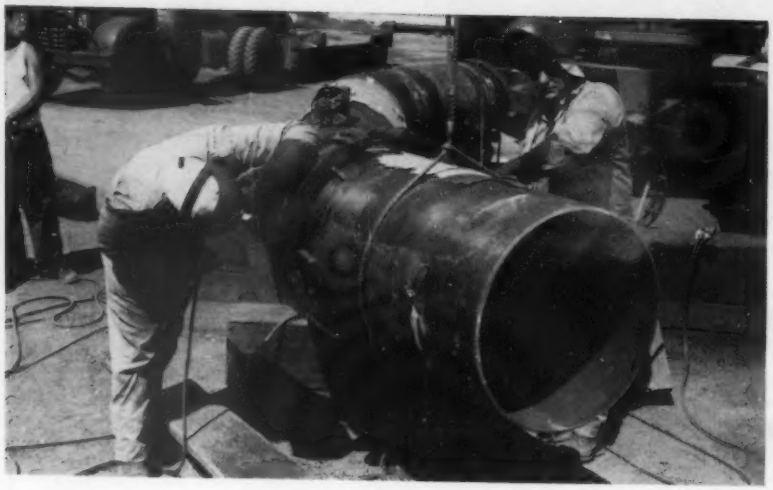
# Joint venture by utilities builds pipeline in Gotham

Prefabricated valve assembly is about to be lowered into place during construction of 25-mile line through Brooklyn and Long Island.

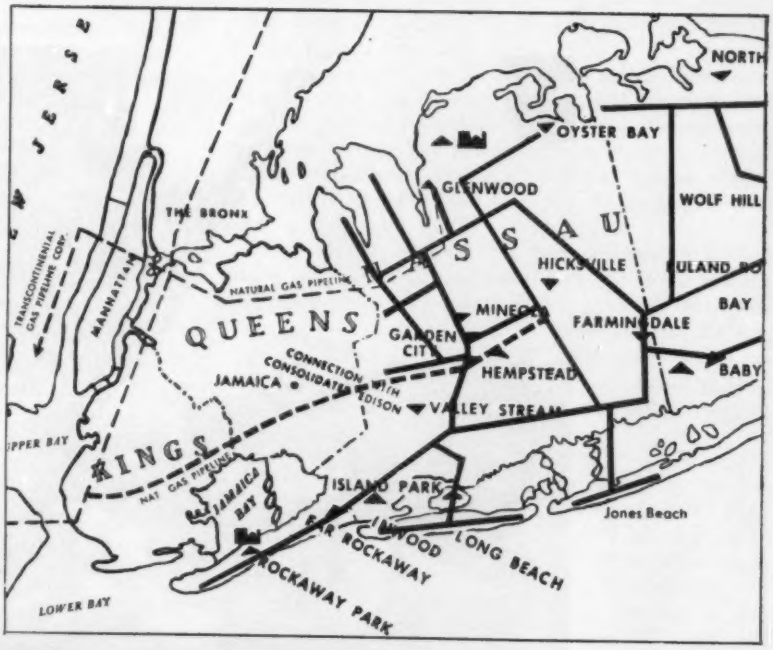
EARLY last fall the turning of a valve signified completion of the 25-mile Southern natural gas pipeline across Brooklyn and part of Long Island. The Brooklyn Union Gas Co. and Long Island Lighting Co., planners of the line, had to contend with some of the more complicated subsurface structures in the country to bring increased natural gas service to customers in the populous Brooklyn-Long Island area.

Planning of the line began as early as 1953, after calculations showed that increased capacity would be needed by the winter of 1957. Construction began in April 1956, and the line went into operation Nov. 14 of last year.

Despite the fact that the line occasionally had to bore deep below a New York subway cut, sewers and utility networks—lowest depth was 20 ft below the Brooklyn Manhattan Transit Co. tracks—the final stages of construction proceeded ahead of schedule. Intersections were excavated in advance to determine the necessary offsets. To speed construction, Brooklyn Union prefabricated the offsets required by using forged welding fittings. Mitres of no more than 4°



Turns are prefabricated in Brooklyn Union yard. Here welder welds mitre joint. All mitre joints had to be no more than four degrees.




This map shows the 25-mile route of the pipeline through Brooklyn to its terminal point in Long Island.

Pipe is beveled by Brooklyn Union crewman preparatory to welding.

To protect pipeline from damage by foreign subsurface construction, some sections were encased "overbends" such as this.

were prepared at the yard.

The line consists of 12 miles of 26-in. pipeline, terminating at a new gate station at Van Wyck Expressway, Queens, and some 13 additional miles of 24-in. line, terminating at Long Island Lighting's holder station on Stewart Ave., Garden City. Starting point for the line is at 37th St. and 3rd Ave., Brooklyn, near the point where Transcontinental Gas Pipe Line Corp.'s 24-in. pipeline enters Brooklyn from across the Narrows.

History of natural gas in the area dates to 1951. With the construction in that year of a 30-in. line eastward across Manhattan Island from the Transcontinental terminus at the Hudson river, natural gas was at first used by both companies as an enricher.

Long Island Lighting is presently approximately 75 per cent converted, full conversion having been delayed partly as a result of the efficiency of the company's Glenwood Landing station. The first catalytic cracking plant used for base load on the Eastern Seaboard, Glenwood Landing has been on stream continuously since 1951, supplying a large percentage of company requirements. Long Island Lighting officials project complete conversion in 1958, at which time Glenwood Landing, another cat cracking plant at Riverhead and propane-air plants at Inwood, Hempstead and West Babylon will be used for peak loads.

In 1952 Brooklyn Union converted to straight natural gas. About that time Transco completed construction of a 24-in. line across the Narrows from Staten Island. This provided Brooklyn Union with reserve capacity for further growth.

Although the advent of natural gas gave the companies a breathing spell, it was apparent that the Southern pipeline would become a necessity due to Brooklyn Union's load growth and increased demands on Long Island Lighting's system. In 1951, Long Island's peak was 28.5 MMcf (53 million of 537 Btu manufactured gas). Last winter the peak was 94 MMcf, and estimates for the winter of 1961-2 indicate that 197 MMcf will be needed.

First step in the planning of the new line consisted of extensive ground work by the development and planning departments of both companies. Two main factors governed route selections: determining the shortest practicable route, and adjusting this route where necessary to obtain favorable subsurface structures. The take-off point was chosen close to the Transco pipeline for increased capacity and a better balanced system, while points along the route were chosen for best entry to intermediate pressure systems. The gate station at Van Wyck Expressway was located to best serve Brooklyn Union's medium pressure Jamaica loop. After a tentative route had been selected, subsurface surveys were made by the companies' distribution departments and the project was

Two sections of the pipeline are tied-in in the trench. Here welders put in the filler bead.

Prefabricated valve assembly is moved into position over trench in populated section of Gotham.

Sandy soil conditions through most of the area have provided local fill for much of the trench. Average cover is 3-ft 6-in.; trench width is 40 in. Where the line bored beneath subway and sewers a 30-in. casing was used. Where subsurface structures were too close a segment of 30-in. pipe was used as a shield. Excavation in advance of most intersections and prefabrication of offsets speeded construction; in each spread the average lay per five-day week was 800-1000 ft of line. On the high week for the project, 1603 ft of pipe was installed.

Attractively landscaped and fenced, the new Van Wyck gate station's two brick buildings house equipment for two-stage pressure reduction, plus metering, odorizing, humidifying and oil fogging equipment. Data from the station is telemetered to the dispatching center at Brooklyn Union's main office which also remotely controls the Van Wyck gate station operation.

Contractors for the eight 2-mile sections of Brooklyn Union line (four completed in 1956 and four in 1957) were DeLee Contracting Co., 3 sections; Poirer & McLane, 2 sections; Oakhill Contracting Co.; Tully & DiNapoli; and Mackay Contracting Co. Karlson & Reed, Inc., Hicksville, was contractor for the Long Island Lighting section. Boring was by Boring, Inc., Queens; and X-raying by Industrial X-Ray Engineers, Woodbridge, N. J. ■

approved by the New York Public Service Commission. Subsequently, final plans were approved by the City of New York.

Design and construction of the pipeline was in accordance with the code for pressure piping, ASA B31.1.8, "Gas Transmission and Distribution Piping Systems," and New York Public Service Commission requirements governing the construction of gas transmission systems were also met or exceeded. All pipe was of welded construction and supplied in 40-ft lengths. Welding flanges and seamless fittings were forged steel. All welding was in conformance with standards set forth in ASA B31.1.8, API 1104 and joints were X-rayed.

Steel Rockwell-Nordstrom Hypreseal valves were installed every mile along the pipeline. Valves are worm-gear operated and equipped with water-tight housings and stem extensions for easy access.

All piping was mill wrapped with double coating of plasticized enamel reinforced with wrapping of fiber-glass. Asbestos felt and a final wrapping of kraft paper followed a third coating of plasticized enamel. Valves, flanges and irregular sections were covered with three coatings of black mastic and glass-wrap. Welded joints and forged steel fittings were coated with two wrappings of polyvinyl chloride pipe insulation. The line is cathodically protected with anodes every 500 ft, insulating flanges at each valve and every half-mile along the pipe.

Design pressure for the line is 350 psi and it is tested in excess of 525 lb. Twenty-four hour hydrostatic tests were run every mile between valves, followed by halogen leak tests at welds.

Down it goes into the trench. All such assemblies were prefabricated in Brooklyn Union's yard.

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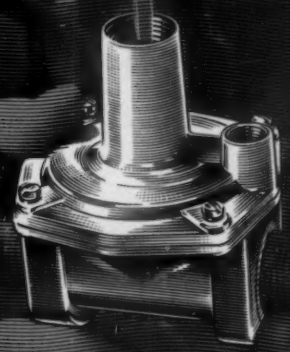

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A typical scene as a gas main is re-located to make way for a storm drain in southwest Los Angeles.

# Preventing damage of gas facilities by foreign sources

By SAM SOKOLOW, Engineering Staff Aid
Southern California Gas Co., Los Angeles

GAS exclusive

PERHAPS one of the most vexing problems confronting a gas distributor has nothing to do directly with gas. It is the ever-present danger to gas mains and services by street improvement work, by installation of storm drains, sewers, water mains, oil lines, electric and phone conduits, power poles, etc.

In some sections of the country, the problem is more acute than in others; but to some degree every gas distributing company has had to find a way of coping with it. On the surface, it appears as if there were a wide choice of methods of solution to the problem, from spending considerable time and money to safeguard gas facilities by anticipating and carefully planning for any potential trouble, to doing little or nothing and repairing the damage after the damage has been done. The latter course can often be less costly, but it can sometimes turn into an incident of serious proportions. Gas people are constantly aware of the potentially serious danger that exists when a gas main or service is broken. And they are also aware of the adverse publicity that follows any damage caused by a broken main. Actually there is not too much choice. Most gas companies, aware of their obligations to the public, will probably want to make every effort to avoid damage to their mains or services.

The solution to the problem is likely to be costly; the returns can be measured only in terms of safety. Yet, perversely, it is a welcome problem; it represents progress and prosperity in the form of improved cities, with more and better utilities to serve the public.

Immediately after the war, and for a period lasting nearly 10 years, most cities in this area of southern California were busy expanding, annexing new, undeveloped territory, and building profusely on them. The gas company met the challenge of expansion with zest and vigor. But soon after 1950 it became evident that the cities had to do something about improving the streets in the older, established neighborhoods; these streets were beginning to look rough, narrow and inconvenient by comparison with those in the new tracts. And aside from the question of improving the streets in the older sections, there was, and still is, one big problem: drainage.

The Southern California Gas Co. realized quite early that it would have to establish a well-coordinated program to cope with the improvement programs planned by the various cities. For this purpose, it set up franchise sections within its various operating divisions for the specific job of protecting gas facilities affected by civic improvements.

Generally the improvement programs of the various cities fall into three main categories: street improvement, storm drains, and installation of other utilities. Here is how the franchise section of southwest division of Southern California Gas Co. works on these problems.

The southwest division is in charge of gas distribution to eight cities, ranging in size from small cities like Hermosa Beach to sprawling large cities like Torrance. It also has, within it, sections of Los Angeles county and Los Angeles city. This division has nearly every representative type of city to be found in most sections of the United States. Inglewood, for example, is an older, traditionally conservative city. Torrance, on the other hand, is an ever-growing city, with new industries springing up over-

night, just barely beginning to catch its breath, and look around.

**• Installation of other utilities**

In order to safeguard gas facilities from damage by contractors installing other utilities, such as water, sewers, etc., the franchise section set up a procedure whereby the city engineers inform us of every project proposed by their respective city councils. As soon as a notification of a project, no matter how tentative, is received, a plan file is set up with all available data and plans on the proposed project. When a contractor is actually assigned to do the job every effort is made to contact him to obtain a starting date.

For example, if a water main is to be installed we notify the contractor of the existence of gas facilities within the area of construction. We then send one of our distribution department men, a field inspector, to mark the gas mains and services within the limits of the job. The field inspector first locates, with a pipe locator, the gas main and gas services, then paints directly above the gas mains and services with yellow paint—a G and arrow for the main, and an S for the service. The contractor installing the water main will usually expose our facilities by hand digging, prior to trenching for the water main. In this way he can be sure of not damaging our facilities. If by some chance, he damages the wrapping on the coated mains or services, he calls the gas company and a crew will be sent immediately to re-wrap the damaged section in order to avoid any holidays in the main coating. Most contractors are aware of the fact that usually no claim will be made against them if they call while our gas pipe is still exposed. If, however, the pipe coating is damaged and they do not inform us, we may establish a claim for damages against the particular contractor. We receive wholehearted cooperation from most of the contractors in this matter. Generally the same procedure serves us to cope with the problem of installation of any other utility, such as sewer, telephone, power, oil lines, etc.

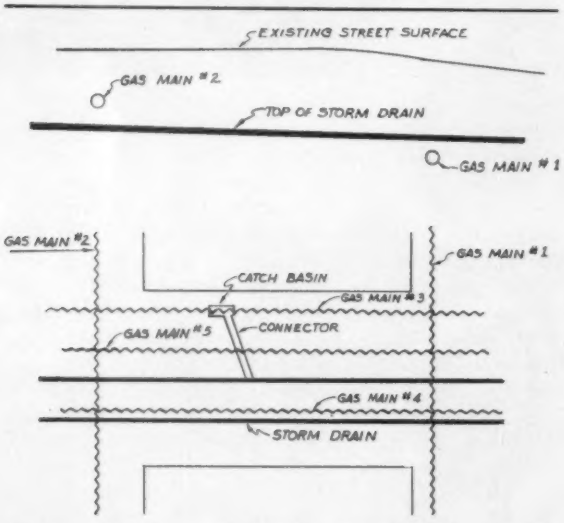



FIG. 1. The above sketch shows typical elevation and profile views of a storm drain, and the most common examples of gas main interference, direct and indirect. Service interference is essentially the same as main interference and is not shown for that reason.

Gas main No. 1 must be raised; it interferes directly with the grade of the storm drain.

Gas main No. 2 does not interfere directly with the grade of the storm drain, but will interfere with the trenching. The main can be removed temporarily, at contractor's expense, if he requests it.

Gas main No. 3 crossing catch basin, interferes directly; interfering section must be relocated.

Gas main No. 4 is located within the proposed trench for the storm drain; it interferes directly and must be relocated.

Gas main No. 5 may or may not interfere directly; the contractor can usually be induced to make a small adjustment of the connector, so that the gas main remains either below or above the connector.

**• Storm drains**

The drainage problem in Los Angeles county has been extremely acute for many years. The county has established a separate division to deal with this problem: The Los Angeles County Flood Control District. The Los Angeles County Flood Control has been in the midst of a very large control program consisting of installation of various types and sizes of storm drains. The average storm drain installation will consist of approximately two miles of storm drains, ranging from 24-in. pipe to 40-ft storm drain boxes, and 50-ft open channels. Most of these storm drains are usually installed in residential areas and, nearly always, despite the effort of County Flood Control design engineers to avoid interference with all utilities, we find that in each separate project, as many as 50 sections of gas mains and perhaps 100 gas services conflict with the installation of the storm drain.

The conflict may take various forms *(see Fig. 1)*. The gas main may sometimes be within the proposed trench for the storm drain, in which case the entire section of gas main must be re-located. Or, a gas main crossing the proposed storm drain will conflict with the grade of the storm drain box or pipe, thus necessitating the lowering or raising of the gas main. Or, again, it may conflict with the installation of catch basins, or with the connector pipe between the catch basin and the storm drain box.

The franchise section receives preliminary storm drain plans well in advance of construction. All gas mains and services conflicting either directly or indirectly are noted in these plans. In the case of mains 8-in. and larger, elevations of the street surface above the pipe, and of the pipe itself are obtained and marked in the preliminary plans. Flood Control surveyors obtain the elevations and we expose the pipe.

However, it is apparent that it would be extremely expensive to obtain elevations and depth of pipe at every point of conflict. For this reason the following system has been worked out. Points of potential conflict between gas mains and storm drains are determined on the assumption that the gas mains have 32 in. of cover, which in fact, they usually do.

If this depth brings it into direct—i.e., grade interference—conflict with the storm drain, the necessary relocations or realignments are made just slightly ahead of the storm drain installations, or sometimes right along with it. But if this depth brings it into possible or doubtful conflict it is assumed that the gas pipe will have to be realigned; all necessary paper work for such a contingency is done in advance: authorizations, sketches, permits, etc. In other words, the job is completely ready to be dispatched to the field whenever necessary.

As soon as the storm drain contractor exposes the main and discovers whether it does or does not conflict with the grade of the storm drain, the course of necessary action is determined. If it does not conflict, we simply have the field inspector watch the area to prevent possible damage. If it does interfere with the grade of the storm drain, we can send a crew to do the work and can usually finish within one or two days so that the contractor is not unduly delayed. Of course, prior to construction of the storm drain, all gas facilities are marked by the patrolman, and carefully watched during the entire period of construction.

We have often found the contractors quite willing to help in the matter of trenching and back-filling the area where the gas main interferes with the storm drain box. Needless to say, the trenching and back-filling can save a considerable amount of money. By making the necessary relocations or realignments of gas mains not too far ahead of storm drain construction, permanent paving repairs can be avoided, and usually, arrangements can be made with the contractor to repair the few necessary paving cuts for less than the usual isolated paving repair costs.

The total cost of relocations of gas mains and services in one single project of the Flood Control District was approximately $25,000. It is, therefore, easy to see why such careful attention must be paid to all details of storm drain construction, and why it is essential to work very closely with the storm drain contractor and with the engineers of the Flood Control District. The franchise engineer must familiarize himself with all aspects of storm drain construction. Only in this way can he effect any substantial savings for the gas company. *He must obtain maximum safety at minimum cost.* There are a number of ways in which substantial savings can be made. Practically all of them consist of timing the work so closely with that of the storm drain contractor that the storm drain contractor actually does a considerable portion of the excavating, trenching, back-filling, and paving, leaving largely the pipe work for the gas company crews. In this matter of timing, the franchise engineer relies heavily on the information supplied to him by the field inspector.

There are ways, however, in which we can reciprocate with the contractor. For instance, if a main crosses the storm drain and must be raised, it may be possible to remove the interfering section just prior to the trenching for the storm drain. This allows the contractor to do the trenching with fewer obstructions in his way. If the main is fed both ways, this procedure is frequently possible, especially since storm drain construction usually takes place in the summer and spring when gas loads are at a minimum. Our experience has been that most contractors will heartily cooperate if we show them that we have no intention of shirking our responsibility; we simply want to avoid doing any unnecessary work. Timing, again, is the most essential factor in this matter; the franchise engineer must know at all times the exact stage of progress of construction and must anticipate the areas of potential conflict and must be prepared to move quickly when, and if, it becomes necessary.

- **Street improvement**

Another type of construction requiring careful attention is a street improvement. There are two types of street improvement: resurfacing, and major reconstruction. Here is our usual procedure:

*Resurfacing:* As stated before, we are informed of all projects proposed by the various cities. In order to insure that we *are* advised of all projects, the franchise engineer visits the city engineer periodically and checks the proposed projects. Actually most of the contacts are made with the city engineers' assistants, who are usually more readily available and who are just as familiar with the details of any project.

As soon as a proposed project is known, the franchise section gives the information to the leakage section. The leakage section investigates the area proposed for improvement for any leaks in the mains or services. All leaks are repaired; or if there are too many leaks an economic analysis is made to determine the advisability of replacing the main instead of repairing it. The primary object in repairing any leaks, no matter how small, is to prevent breaking-up a newly resurfaced street. This is most important from the viewpoint of public relations.

If the proposed project consists of only resurfacing the street, then the only problem, aside from a leakage investigation, is that of watching all valve casings in the street, and making sure that they are not covered by the new surfacing, and if necessary, raise them to the new street level. Here again, the field inspector is the key man; he must watch the area carefully, for as in these projects, timing is the most essential factor. The field inspector is, of course, in constant touch with the franchise section.

*Major reconstruction:* It is in the case of major reconstruction that gas facilities are most affected. On these projects we must have street improvement plans; these plans show the existing and proposed grades both in the street center line and at the curb locations. Here is where careful analysis is imperative, if we are to achieve the major aim of the franchise section; maximum insurance at minimum cost. The problem can best be shown by taking an actual project and following the steps taken to prevent damage.

The city of Manhattan Beach proposed the major reconstruction of 24 streets. The project included grading, filling, construction of curbs, gutters, sidewalks, cross gutters, and surfacing of the streets.

**TABLE 1. Elevation and depth data are recorded like this for quick reference**

| Station Location | Address | Elev. of exist. surface over pipe | Depth of pipe from exist. elev. | Elev. of pipe (Surface elev. less depth of pipe) | Elev. of prop. surface | Depth of pipe from prop. surface | Status of pipe |
|---|---|---|---|---|---|---|---|
| 33 + 20 | main | 52.80 | 3.20 | 49.60 | 52.65 | 3.05 | OK |
| 32 + 70 | 4106 | 53.20 | 2.00 | 51.20 | 52.48 | 1.28 | Shallow Lower 12″ |

The plans were received approximately six weeks ahead of the starting date of construction. Immediately after receiving the plans, the leakage section was notified to determine if any mains were to be replaced, and to insure that such replacements would be installed at the proper depth to make sure that they would not conflict with the grading for the street improvement. A careful analysis was made of the plans to determine the areas of danger for gas mains and services. Some streets had to be deeply graded in order to obtain proper drainage; these were the points to be carefully watched. If the average depth of the main appears to bring it into a potential construction damage zone (6 in. for small diameter mains; 12 in. for trunk lines or transmission mains), it is necessary to make physical checks of the actual elevation of our facilities. These elevations are then used to determine the need for lowering or relocation. Many factors now had to be considered to determine the need for lowering or relocation. Many factors now had to be considered to determine the exact point at which mains and services required checking. Wholesale checking would be far too expensive and, in the final analysis, would not disclose any more than a selective checking.

A. *Mains*

1. Age of mains. Newer mains have been laid with a minimum of 32-in. cover.
2. Size and pressure. The larger the main the more care; the same is true of pressure. Sometimes it is advisable, wherever possible, to lower the pressure during construction.
3. Position of the main in the street. If the main is close to the proposed curb, it requires more clearance than if it is located near the center line of the street.
4. Valves, fittings, nipples. Pressure control fittings and nipples stick out above the main by a minimum of 6 in., which is sometimes the only clearance between the main and the bottom of the sub-base. Valve casings can easily be broken or bent by grading equipment, and often the valve stem is broken by a bent casing. We have established a system of removing the casings prior to construction and reinstalling them, just before final surfacing, at the proper level. Gate valve stems protrude at least 6 in. from the main according to the various sizes. As with fittings, they must be considered critical points. Sometimes it is necessary to lower the valves, relocate or remove them entirely.
5. Check mains either crossing, or closely paralleling, cross gutters; 32 in. minimum clearance is required under them.
6. If the clearance is critical at any point, it is often possible to avoid lowering of a main or service by exposing it during grading operations.
7. Before relocating or realigning a large size main, check with the city engineer to see if the final grades can be adjusted to avoid any work on the main. Sometimes a small grade adjustment, consistent with sound engineering practices, will be enough to save a great deal of work on our part.

*B. Services*

Generally speaking, long side services (services to houses farther away from the main) are most affected by a major street improvement. The deepest cut in the street is usually made at the curb and gutter location. Of course, if the main is found to be too shallow, then the short side services are usually shallow too. The following factors must be considered in determining the safety of the services.

1. Age of service. Old services are often shallow because of previous street gradings.
2. Extent of cut necessary to achieve final grade.
3. Curb valves and casings. Casings should be removed during grading and reset at new levels after grading. The valve stem can easily be damaged if the casing is twisted or broken.

Elevations and depth are obtained at critical points. All data are then set into a single sheet for quick reference, as shown on *Table 1*. After lowering the section of main and/or services, it is advisable to make occasional field trips to impress the contractor with the specific danger within the area of construction.

Although the franchise section can measure its main contribution in terms of safety and public relations, it can quite often effect substantial savings in main replacements that are proposed ahead of street improvements. These savings are usually the result of information obtained through the contacts made with contractors, city engineers and their aides, representatives from other utilities, and having worked closely with these people.

If the job is done well it can be rewarding and stimulating. The work can give one the satisfaction of not only being useful to the company, but also of rendering a public service in maintaining adequate safety. ■

*Claims and litigation resulting from . . .*

# Explosions in utility installations

By STRATTON HAMMON, President
Vibration Damage Specialists Inc., Louisville, Ky.

*Part 1 of this series, describing claims and litigation resulting from pipeline and compressor station operation, appeared in the April issue of GAS. Mr. Hammon concludes his discussion with this article.*

THERE are a number of factors which make it certain that the incidence of serious gas explosions will increase from year to year. Increase of consumer installations alone will multiply the inherent risk. Crowding, as the population intensity grows, will increase the number of claims resulting from each explosion. The complicated character of our civilization will also cause an increase in the number of damage claims erroneously laid at the door of the utilities and transmission companies. Finally the awakening claims consciousness of the public will create claims where none existed before.

The tendency is also for the claims and the verdicts to mount tremendously in dollar value. Most of GAS' readers have heard of the $750,000 verdict recently rendered against the Commonwealth Edison Co. and the Northern Illinois Gas Co. in a personal injury case involving only one person. This resulted from an explosion caused by normal utility field operations. Judge Scarbaro of the Superior Court at Chicago recently upheld the lower court with the opinion that the judgment was not excessive. This amount is $330,000 greater than the previous high, also at Chicago, handed down in 1954. In our experience, we recently have been called into a situation in New York in which almost $100 million is claimed in personal injury and property damage as a result of an explosion last December.

There is no doubt about it, these matters can get out of hand, if not handled with great care, and sometimes can lead to serious financial predicaments.

Dependency upon insurance coverage is only partly the answer to this problem. Many companies carry their own insurance. Others have a co-insurance arrangement under which they pay part of the losses directly, in addition to their premiums. It is also true that many times the total of claims resulting from an explosion exceeds, by many times, the total of the insurance coverage. Even in those happy cases where the insurance is sufficient to take care of all losses and the expense of defense, the respite gained is only a momentary one. The

Leaking gas from a roof furnace was pulled through a roof ventilator by suction of kitchen exhaust fan. A cook lit a cigaret in the washroom (visible in picture). The resulting explosion injured three.

losses sustained by the insurance industry because of operations of the gas industry will be spread in the following years over the entire gas industry by increased premiums. Hence, it will save the gas industry millions upon millions, directly or indirectly, if it will give attention to and take action toward keeping claims and losses at a minimum.

The insurance industry is so large and unwieldy, something like the army, that it does not always handle its own losses carefully, and such unnecessary losses are, of course, also eventually placed on the back of the policy-holder.

Notice the views of Patrick Magarick, secretary and general claims manager of the Pacific National Group, who recently declared, "As the size of verdicts has been increasing throughout the country, the degree of publicity given them also seems to have been increasing. The tendency of the average man after seeing repeated instances of high verdicts, is to begin to look at them as the normal rather than the abnormal condition. This undoubtedly has some bearing on his own reaction. . . . So far, the attitude of our industry has been to wring its hands and cry in despair, but to do absolutely nothing further about it . . . while some new defense techniques have been successful against certain plaintiff's attorneys, I believe that the insurance industry as a whole has made no effort to use the combined talents that we have. Nor have we done much to develop new talent in the defense field . . . let's have them working for us instead of against us."

Financial safety in these matters is purchased only at the cost of constant attention by the gas industry to the step-by-step procedure necessary to insure that equity will be maintained even under conditions imposed by sudden, unexpected, fortuitous events.

There are a number of different conditions under which explosions occur during utility construction and operation. Three of the categories into which these explosions can be grouped are listed below and a brief case history from our files explored in each, omitting the technical factors. The article will be concluded with an explanation of the procedure necessary to successfully defend against excessive or improper claims.

**• Explosions resulting from failure of company equipment**

Whenever an explosion occurs there is usually a quick concentration of various types of more or less expert talent at the site. Beginning with the fire department, next will follow a crew from the utility company, and then a representative of the state fire marshal's office will appear on the scene at about the same time insurance adjusters arrive, and finally the blast damage specialists will be brought in by one side or another. The utility crews, arriving as quickly as they do with equipment necessary to test lines, meters, valves, etc., usually secure the most vital information. Sometimes they carry off equipment for further testing. This can lead to legal censure as will be seen later.

Last year in a small town in Ohio a homeowner descended the basement steps and began to walk across his recreation room to pick up several spools of miniature movie film. In the middle of the room he stopped to light a cigarette. This touched off an explosion which blew the house to pieces, literally around his ears. The caprice of such explosions is such that in spite of a force sufficient to bend outward and break off a heavy concrete foundation where it arose above the grade just 6 ft from, and on a line with his shoulder, he was only slightly injured and was able to make his way out of the debris under his own power. His wife, who was in a second floor bedroom, rushed to the top of the stairway to find the living room open to the world, the walls blown onto their neighbor's lot. Odd effects occurred, such as the massive brick chimney being blown away in its lower sections while the upper part remained sitting serenely on a bit of roof which did not seem to have enough support to keep its own weight in the air. The shock was so great that practically the entire exterior masonry wall fell to pieces and had to be replaced with a brick veneer wall.

The local fire chief arrived within 10 minutes and found the gas meter blown off its coupling and the remaining part of the service line blazing where it penetrated the concrete foundation wall. A small amount of char directly over this blaze was the only fire damage which resulted. As usual the utility crew, which came after the fire chief, cut off the gas supply and removed the meter from the premises.

Later all possibilities of the source of the explosive — sewer gas, gasoline fumes, dynamite, or other agents—were carefully traced down and eliminated. Next the possibility of a leak in the owner's gas lines, boiler, and many appliances was explored and found to be negative. Only then was blame attached where it obviously lay, in the gas meter.

In this particular case the damage was far more extensive than usual in similar cases because the exterior walls had been constructed of structural hollow tile. These make excellent pipelines when laid end to end and the gas had seeped through much of this wall. It was shattered and fractured from the internal explosion. Much of it was not reparable.

The only problem in such cases of admitted liability, after making certain of the technical causes, is to secure an equitable adjustment of the damage. The president of the National Association of Insurance Commissioners recently stated, "I do not believe the policy-holder is the profiting party. From my experience those who profit from losses are the persons who perform the services and repairs that become necessary after a loss." To prevent such profiteering your specialist should have thorough knowledge of architecture, engineering, and contracting and be abreast of current building prices. In our experience we have found the insurance commissioner only partly in the right—many policyholders have profited or have tried desperately to

profit from a loss. One case in a southern city comes to mind. The insurance companies carelessly paid out three quarters of a million dollars after an explosion on the plea of surrounding property owners that their buildings were seriously damaged and urgently needed repair. A survey disclosed that after the passage of two years only $25,000 of this $750,000 had been actually used for these "urgent" repairs. The balance had been pocketed, mainly because the alleged damage had not occurred in the first place.

**• Explosions resulting from failure of customer's equipment**

In a midwestern city a church and Sunday school under construction was so near completion that the congregation had been using the building for several Sundays. On this occasion the Sunday school had discharged its human cargo of children when the pastor, after seeing everyone out, had noticed a light burning in the nave and returned to turn it out. When he flicked the switch the whole place erupted. He was blown to the floor and burned about the head and shoulders. The wing which had held the small children was utterly demolished. Windows, glass, and the masonry walls were blown as far as 75 ft and the debris caught on fire. The church proper had one wall blown outward and fire charred all of the fine beams and woodwork over the nave. We arrived before the fire department had quenched the fire and at first searched for another explosive because the quick heat of the fire and searing effect suggested agents other than natural gas.

Early as I was, the utility crew was already digging to make the line tests when I arrived. The large meter was installed on the exterior of the building. The line proved tight between the main and the meter but between the meter and the main valve, where it entered the basement, it would take no pressure whatever. Digging revealed that the 3-in. line had broken at a threaded joint as it crossed a courtyard 20 ft from the nearest wall of the building. The meter revealed that for the past five days 100,000 cu ft had been lost each day through this break. The escaping gas followed its own line ditch back toward the street for 30 ft and then seeped along a filled ditch holding electrical conduits which passed under the children's wing. The floor of this wing consisted of a concrete slab over crushed stone resting directly on the earth. The gas used the voids of this crushed stone as a reservoir and from there seeped into the electrical conduits, along the heating pipe, and into the voids of the exterior wall.

Except for two small "ifs" the local utility company would have had a ruinous and horrible catastrophe in this case. If the break had been on their side of the meter and if the children had still been in the building it is easily conceivable that $50 million of death and personal injury claims would have resulted. It is suggested that threaded steel joints so often break in this manner that welding be seriously considered even in small services. At least the better fittings should be insisted upon. As it was the casualty insurance company, covering the general contractor, stood the loss of $100,000 and will probably subrogate later against the plumbing sub-contractor and his insurance carrier.

Utility company workman removes gas meter from scene of church explosion in St. Matthews, Ky. Sunday school had been dismissed shortly before explosion shattered nearly-built church.

In December of last year a tavern blew to pieces in a thickly populated section of Boston. The force was sufficient to inflict severe damage to surrounding buildings while the tavern had to be razed. We have inspected reinforced concrete commercial buildings half a mile away whose owners claim that they have suffered serious structural damage as a result of the explosion. The duty of a specialist in such cases is to define exactly the extent of damage connected with the explosion, in those buildings known to have sustained some damage. In many cases the owners have failed to observe the natural deterioration over the years and carefully hunt for damage only when alerted by an explosion. It is the job of the specialist to separate blast damage from normal constructional wear and tear. He must then proceed to the next step and separate those who have sustained some explosion damage from those who have had none at all but who "want to get in on the act." It is not at all unusual to have claims so far removed from a mild little explosion that even the H-bomb would not have inflicted damage. One such occurred in Oklahoma City. There was only enough explosion to blow the glass out of a building 100 ft distant but 3600 claims poured in, some 13 miles away. One man put in claims on three buildings, 4, 5 and 7 miles removed.

**• Explosions of indeterminate origin**

One of the mechanics of a garage in a mountain town walked into the basement to start an air compressor. When he threw the switch a flaming explosion resulted. The mechanic fell, then rushed, all afire, for the stairway. He lived for a while, but finally died of his burns. The property damage was considerable, but mostly as a result of fire.

The origin of the explosion could not be determined by the local authorities. Neither the fire de-

partment, the utility experts nor those from the oil company, supplying the connecting service station, could agree. The specialist found that all the gas equipment checked out perfectly. He also noticed that in spite of the apparent heat intensity of the explosion no walls or partitions were pushed out of place. Some of the plate glass was even intact.

On the other hand the heat had even melted plastic ornaments on desks in the first floor offices, one story removed from the origin of the explosion. These characteristics pointed to an explosion of gasoline but there was no gasoline stored in the building! By carefully tracing the char and burn, the flow of fumes before the detonation was plotted as they entered the basement from an electrical conduit and then were gently wafted by a breeze, coming in a small open window, up the open stairway to the first floor. The electrical conduit was the one which furnished current to the gasoline pumps in front of the garage.

When we informed the oil company of our decision that gasoline fumes were responsible we were met by a fury of protests. "No leakage had ever occurred in these tanks." They would show us how incompetent we were by excavating the tanks! A high test tank was the first to be lifted out of the ground by a crane—with gasoline spurting out of 20 holes in the bottom!

In the past the gas industry has defended this variety of suits on a sort of catch-as-catch-can basis and the results have been commensurate with more or less haphazard efforts put into the defense of the cases. The inept defense of some companies seems to stem from a sense of original sin and a defeatist attitude that a corporation cannot prevail before a jury or ordinary citizens. Since it is cerfain that in the future such claims will show a frightening increase, in both number and size, some manner of more effective organized defense must be explored.

Whenever there is a possibility of litigation developing, the habit must be abandoned of conducting an investigation with company engineers or employees. It is not because—to a large extent—the company personnel are incapable of doing this but rather that their findings and testimony in any resulting trial would be considered prejudiced and therefore of little weight. This applies also to engineers in constant employ of the insurance companies. Time after time we have suffered in court because meters, regulator valves, etc. have been carried off of premises where explosions have occurred, and tested in company shops. Under such conditions plaintiff's attorneys charge concealment of evidence, falsifying reports and tests, and anything else derogatory that happens to enter their heads and little defense can be made. Do not remove any type of equipment from the site of a catastrophe or make any tests unless accompanied by an agent of the owner or at the very least by a disinterested outside party.

If there is a possibility of claims amounting to thousands or even millions resulting from an explosion it is a reckless gamble of company money to fail to spend a few hundred dollars and quickly fly in a specialist. Even in the worst of cases, those in which it is found that the company was negligent and in the wrong, the investment will return a profit for it will keep the specialist from being commissioned by the plaintiffs. Like an attorney he may represent only one side in a case. In general, however, he will be worth his weight in gold.

The modern vibration damage specialist is a highly developed tectonicologist who must be able to qualify not only actually, but legally, as an explosive engineer, seismologist, structural engineer and architect. He must, in addition, know enough of this narrow phase of law to enable him to make a good witness. This wide range of abilities is necessary because he must be able to give negative expert testimony that a given detonation did not cause damage with the same facility that he places positive testimony into the record proving that the claimed damages resulted from causes other than those alleged. Gone are the days when a local civil engineer assisted by a contractor could provide effective expert testimony in such cases.

One of the country's best trial attorneys once insisted to me that testimony proving that a certain explosion could not have effected the alleged damage, was negative and therefore worth 20 per cent in winning the trial. Testimony proving that the alleged damage was actually to be attributed to normal constructional causes was positive and therefore to be valued 30 per cent in winning the case. The remaining 50 per cent according to him, depended solely upon the legal sixth sense and court room know-how of the expert witness. We arranged the basic policies of our firm to fit this conception and time has proven the soundness of this man's insight. Since that time not one cent has been lost in any suit, involving gas explosions or gas operation, in which we have been fully involved.

To understand this it is necessary for the layman to understand how much the courts are concerned with the form of the law and how little with the facts of the case. The ordinary man, especially the professional man or scientist, believes that all that is required is to prove by mathematics, engineering, or science that a natural law is involved and that thus and so are the true state of affairs. His first shock will come when he finds that under the rules of evidence most of his "proof" cannot be introduced into the record at all and that which is admitted will receive no more credence than the old wives' tales and fantastic guesses of the local prejudiced witnesses. Technical and scientific evidence can be introduced and receive its full and proper attention only by the most careful preparation and legal generalship.

The great majority of claims against the gas industry do not terminate in litigation but it is true that if each claim is prepared as though this may happen this preparation goes a long way to insure that a court room will never be reached. It also insures that the adjuster or attorney who makes the final compromise will be negotiating from a position of strength instead of one of weakness. ■

Appliance dealers watch as Mrs. Jean Turney, East Ohio home service representative, points out some of the special features of a gas range at a program for salesmen and dealers.

# Home service boosts gas by showing it in action

By EVELYN M. WINKES
General Home Service Director
East Ohio Gas Co.
Cleveland, Ohio

A PICTURE of two boys, intently preparing a lemon roll for baking, recently appeared in the Kent (O.) newspaper. The young gentlemen, all of 12 years old, were participating in a baking contest sponsored by the local boys' club.

Not too long ago, another class was graduated from the Cleveland Society for the Blind cooking school.

Our home service department had something to do with both events. In the case of the Kent contest, one of our home service representatives served as a judge. Of course, gas ranges were used by the young chefs for all the baking.

In the other event, we were most active. Two members of our department served as instructors two days a week for six weeks, teaching these handicapped women to measure ingredients, and familiarizing them with the use of gas ranges, in such a way that today they are as skilled in meal preparation as many of their more fortunate sisters.

These two examples are given because they suggest the scope of The East Ohio Gas Co. home service department's undertaking. We are so convinced of the advantages of gas appliances in the home that we feel one of the best selling media for them is their use.

We make it our job to permit as many persons as possible to use gas, to see it in action. We feel certain

## HOME SERVICE AT WORK

### . . . in schools

Home service representatives, Mrs. Kay McCafferty and Mrs. Nancy Craig conduct demonstration in a Cleveland high school.

### . . . on television

Appearing on a women's show over a Youngstown, Ohio TV station are Mrs. Jean Hassel and Doris J. Baer (right).

### . . . at home shows

Yvonne Sutton (left) of East Ohio points out features of an all-gas kitchen to a visitor at the company's booth at the famous Cleveland Home & Flower Show.

that the many automatic features of today's gas appliances, the value of gas and its inherent dependability and flexibility are so convincing that they will overcome the strong sales campaigns of our competition.

In the past few years, our appliance industry has done an excellent job in developing features that make the "more modern" boasts of our competitors sound quite hollow. This is particularly noticeable in the category of ranges.

Built-ins were a revolutionary and dramatic change. The thermostatically controlled top-burner, the Burner-with-a-Brain, emphasized more than ever the controlled heat, the automatic features of natural gas for cooking.

The inclusion of the rotisserie in free-standing gas range models was a wonderful development. To borrow the idiom of an advertising copy-writer, it made outdoor living possible the year round. But, it's true. In fact, we often hear that for the first time father and junior, formerly adept at nothing but outdoor charcoal cooking, are pressing for an opportunity to use this new feature to demonstrate their culinary arts.

It is here that we expect the greatest advance in the gas range field in the immediate future. The rotisserie is the type of "extra" that will appeal to not only women but men. It soon will be incorporated on a greater number of free-standing and built-in range models. The reason is simply that it has been so well accepted thus far.

Still, we cannot assume that the Burner-with-a-Brain, the rotisserie and other innovations will overwhelm homemakers all by themselves. They, of course, have to be sold. They have to be kept sold.

It is here that the home service department of a gas company is invaluable. It is in this vein that college trained home economists must exert every possible influence through organized programs such as cooking demonstrations, special schools such as the one for the blind mentioned earlier, and, in cooperation with school systems, in home economics classes.

For example, we have a program entitled "Kitchen Kapers" which we will give to any women's group or club in the districts we serve. And that, by the way, includes the northeastern section of Ohio—about three-quarters of a million customers in 150 communities.

In this program, we place emphasis on the importance of a well-planned kitchen.

"Perfect kitchens just don't happen," we say, "they are planned."

We appeal to each woman in our audience to consider her family's needs. We emphasize that it is entirely possible to tailor a kitchen specifically for her work habits and the needs of her family.

Does she do considerable baking? Then maybe the oven should be placed in a spot more convenient to counter-tops which serve as serving areas.

We then show our guests, with planning boards, the many variations that can be called upon to produce a "tailor-made" kitchen. And of course we stress the value of gas appliances.

Our planned, model kitchens include a matchless gas range and gas refrigerator; the laundry room, an

automatic gas dryer. For today's modern living with the increased need for hot water, we point out the advantages of a 40-gal. AUI water heater. And we show the value and convenience of other gas uses—air conditioning, heating and incineration.

We carry the theme of Kitchen Kapers into concrete reality with our kitchen planning service. Just for the asking, we will visit a homemaker, study her working habits and then suggest a kitchen arrangement which we feel is best suited to her. We will invite her to our appliance display floors, help in the selection of her gas appliances, and when installed, explain their operation so that she will get the most good out of them. This, of course, is part of the "keeping them sold on gas" program.

The gas company home economist can help sell builders on the benefits derived from installing gas appliances in new homes. In cooperation with sales department personnel, we make it a point to have representatives from our department on hand for the showing of new homes equipped with gas. These home service representatives can capably point out the advantages of the model home's kitchen and laundry utility section in terms that a woman understands. The result is that the builder has a good saleswoman assisting him.

One thing that we have learned as a result of our contact with homemakers through our kitchen planning and presence at display homes is that more and more emphasis is being placed on space for eating in the kitchen.

We often hear the comment: "Eating areas in the kitchen are so convenient, why do they plan a kitchen without one?"

As home economists we feel that the kitchen very often sells the home. So, it might be wise for builders to give more consideration to such requests in the future.

A very important part of East Ohio's home service program is keeping customers sold on gas once they have it. In addition to the work our kitchen planning experts do, our home service representatives visit homes where a new gas appliance has been installed. We explain the special features of the new appliance. If it's a new range, we demonstrate the operation of the Burner-with-a-Brain, the automatic clock control and answer any questions about the appliance or food preparation,

We make sure that the appliance is perfectly adjusted and its controls are properly calibrated. If they aren't, we call one of our customer servicemen who performs the service free. We also take advantage of this opportunity to familiarize the homemaker with the other free services of the company.

We invite her to telephone us for recipes that we are certain are good because we have tested them. These are also available in booklet form and are sent out upon request.

Because we feel that it is very important that she get the best performance from her appliance, we invite her to attend demonstrations we give in the kitchens of our division offices.

One demonstration deals with cooking; another with laundering.

Maureen Hart of East Ohio's kitchen planning staff demonstrates the use of the planning kit to Mrs. Beatrice Cornely of the home service department.

The cooking program is geared not to show a woman how to cook, but to demonstrate short cuts and the correct use of all the features on her gas appliances.

The laundry program deals with the care of the family's clothing, pointing out the need for sufficient hot water, the proper use of soaps and detergents and the correct use of the automatic gas dryer for clothes drying. We also illustrate the other jobs a gas dryer can do such as removing moth ball odor and fluffing feather pillows.

Of course, these demonstrations also are available for presentation before club groups at their meeting quarters.

The young, aspiring cook is very important in our program, too. In cooperation with the school systems in the area we serve, we bring the concepts of basic food preparation, and the use and care of a gas range to the classroom.

We consult with junior and senior high school home economics teachers and county home demonstration agents, and have special programs for them to demonstrate the very latest in equipment and food products.

Girl Scouts not only learn to cook with gas as a result of one of our programs, but are given the opportunity to earn a merit badge toward advancement in their fine organization. A similar program exists for the 4-H Clubs.

It is no accident that East Ohio considers us part of the sales department. It's our job to sell gas and gas appliances in every way possible; to make sure that everyone is aware of the assets of natural gas in the home.

The home economist has a real advantage in the appliance sales field just because she is a woman. She talks the homemakers' language and what she has to say—be it at a county fair, a formal cooking demonstration, on the display floor of the gas company offices or a department store or on a women's radio or television program—will have more credibility.

This advantage must be utilized to its full potential in our industry. ■

# Infra-red heating system developed for today's 'factory of tomorrow'

**By C. H. FOULDS, Vice President**
Perfection Industries, Cleveland

INDUSTRY'S need for an economical method of heating such high-bay buildings as foundries, warehouses and aircraft hangers has increased markedly in recent years. Commonly accepted space heating systems based on water, air, steam and electricity have become more expensive and less satisfactory as buildings grow in size and heating requirements grow more complex. Frequently, as at loading docks and other partially exposed areas, space heating is impossible.

Heating engineers recognize that conventional space heating systems operate indirectly, creating a blanket of air around a person to reduce body heat losses, rather than heating the person directly. In small, enclosed areas this is not a particular problem, but as floor space grows and roofs become higher, more and more Btu's are necessary to heat increased amounts of air for comfortable working conditions. Heating costs rise proportionately.

In its efforts to alleviate the high-bay heating problem, industry has tried a number of techniques, the most promising of which has been radiant heating. Because it heats surfaces and people directly

Monthly winter heating averages $168.48 for the 26 infra-red generators in this 754,000 Btu installation (below) at Huron (Ohio) Manufacturing Co.

rather than by convection from warm air, this type of system overcomes many of the shortcomings of space heating.

The two most common forms of radiant heating are panel heating and infra-red heating from above. The former uses the floor or wall area as a radiator, with the source of heat imbedded in it. This system has gained acceptance in home-building and similar applications, but cost considerations have caused drawbacks in industrial use. Installation cost is relatively high, owing to the tubing used to circulate heat through the floors or walls.

This cost factor is largely overcome in overhead gas infra-red radiant heating because the source of heat is above the floor rather than inside it, eliminating the need for tubing. Heating technologists for several decades have attempted to capitalize on these advantages, but have been stymied in perfecting a simple, efficient gas infra-red generator. The chief problem lay in the fact that the generators' comparatively low operating temperature did not produce infra-red of sufficient intensity. These units utilize a standard gas burner to heat metal strips, tubes or louvers which emit infra-red energy. This intermediate step in the heat-transfer process—similar to using a heat-carrying fluid such as water or steam in conventional systems—further reduced the generators' efficiency.

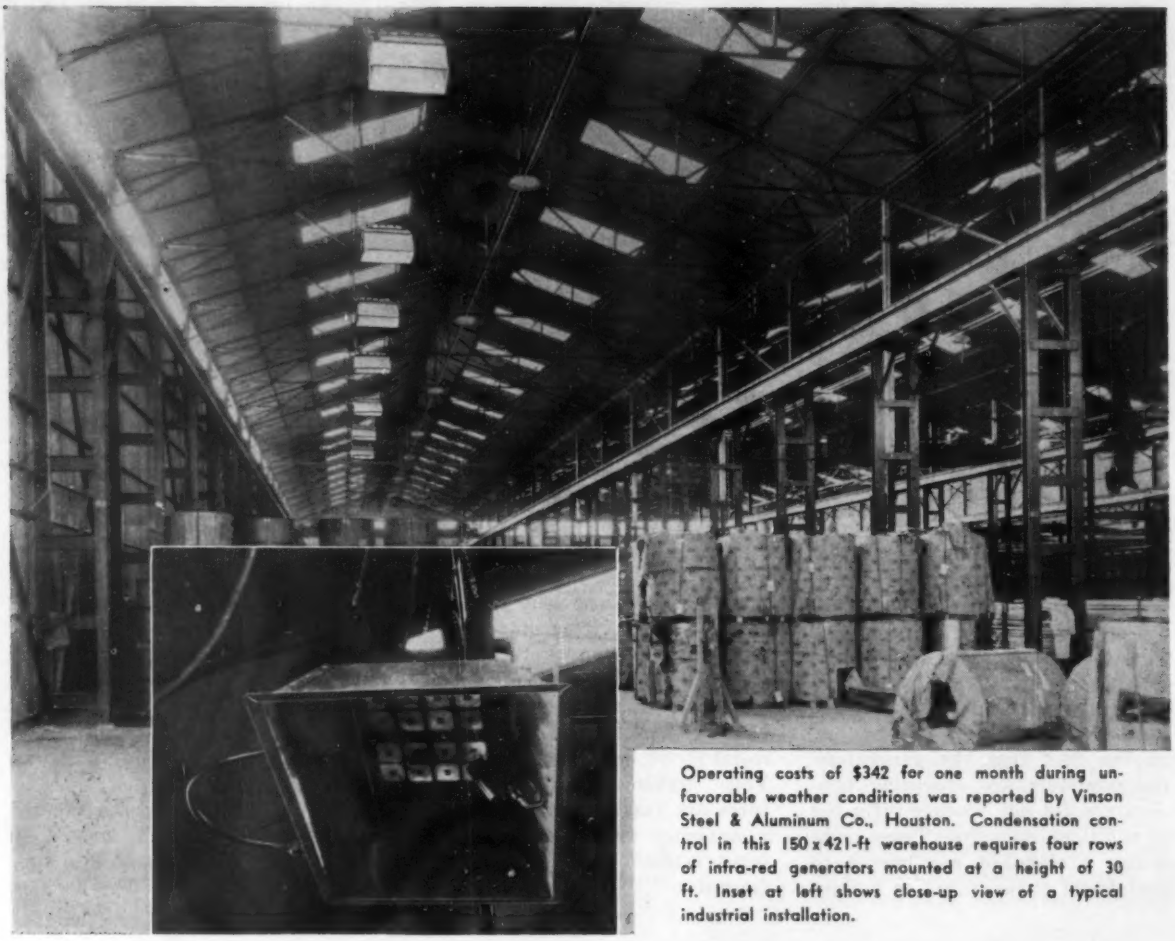
A radically new approach to gas infra-red generation by a German scientist, Guenther Schwank, has promised a solution to the problem. Generators based on his invention were brought to the United States in 1956 from Germany and are now being made here under license agreements. Their success in difficult and varied applications both here and abroad indicates that gas infra-red radiant heating may well become the conventional method for heating the factory of the future.

The Schwank technique differs markedly from previous gas infra-red generators. One stage in the earlier generation process is bypassed completely by using the structure which supports combustion as the infra-red emitter. No metal strips or louvers are needed. Thus higher operating temperatures are feasible, and as a result a maximum proportion of the Btu input is converted into usable infra-red.

An operating temperature of 1650°F is achieved in the Schwank generator by combustion of gas on the surface of a patented ceramic mat. Each ceramic unit is perforated with 200 holes per square inch through which an air-gas mixture feeds. The large number of holes and the physical characteristics of the ceramic material make possible the relatively high surface temperature achieved. Because gas is converted into infra-red energy in the wave lengths readily absorbed by most common materials, the generator is considered the most efficient and economical known today.

Conventional calculations for determining the amount of heat required for comfort heating of a building are not applicable to infra-red. Its rays, like those of the sun, warm only the bodies which absorb them and not the air through which they travel. Once the energy waves emitted by the gas generator strike a person in their path or the floor, wall or machinery, they are transformed into heat.

The feeling of warmth created by infra-red can be illustrated by stepping from the shade into sunlight on a cool day. The body is



Operating costs of $342 for one month during unfavorable weather conditions was reported by Vinson Steel & Aluminum Co., Houston. Condensation control in this 150 x 421-ft warehouse requires four rows of infra-red generators mounted at a height of 30 ft. Inset at left shows close-up view of a typical industrial installation.

warmed instantly while the air remains cool. In an infra-red heated building, a person is warmed by radiation from the generator and by radiation, conduction and convection from the floor-wall-machinery surfaces, which become radiators themselves. Workmen don't experience a sharp change in air temperature when they go outside or into unheated areas of the plant; tools and machinery are always warm to the touch. Additional advantages are absence of drafts, noise and odors.

Because infra-red heat requirements are calculated in square feet instead of cubic feet, no single yardstick can be used to compare performance with conventional space heaters. Generally, gas-fired infra-red can lower heating costs by 20 per cent in a building easily heated by other methods. In hard-to-heat buildings, heating costs can be reduced up to 50 per cent. In addition, infra-red can provide spot heat in warehouses or other unheated buildings as well as at loading docks and other partially exposed areas. The infra-red generators can be installed at any height as low as 7 ft and as high as 60 ft without sacrifice in efficiency. Sidewall mounting of infra-red generators is also possible.

Operation of the new infra-red generator on natural, manufactured or liquefied petroleum gas is extremely simple. Gas is metered through an orifice, passes through an air aspirating chamber and a mixing tube to a chamber under the ceramic mat where it is distributed uniformly through the ceramic. This is a 100 per cent primary air burner, requiring no premix or blower.

U. S.-designed gas generators based on the Schwank principle are multiples of an eight-ceramic combination called a "rayhead." These rayheads are grouped in an aluminum reflector which helps direct infra-red toward the surfaces to be heated. For installation in high-bay buildings, a large number of rayheads are combined in the same fixture to radiate over a large area.

Generator models for indoor use have been approved by Underwriters Laboratories and American Gas Association. Zone thermostats are normally used for heating; they are hidden from the rays of the generator so that heat rising from the floor controls the temperature. Life expectancy of the unit under normal service conditions is unlimited, with adjustments and repairs seldom if ever necessary.

Operating results established in U. S. installations to date are impressive. Following are several examples of the new gas infra-red generators in various types of industrial buildings:

*Huron (Ohio) Manufacturing Co.*, a metalworking firm, installed 26 infra-red generator units in a 754,000-Btu installation for an all-steel building with concrete floor covering 6400 sq ft. (For space heating, a 1 million Btu system would have been required.) Cost of heating this building with natural gas for an eight-month period from October 1956 through May 1957 was $1036, or 0.16 cents per square foot.

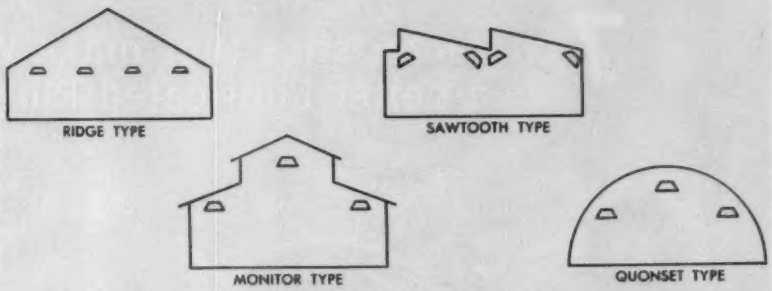
*AllCast Non-Ferrous Metals Co.*, Newark, N. J., calculated annual fuel savings of 55 per cent by heating a 35-ft high foundry building with infra-red. In addition, the company spot heats an adjacent building used for grinding operations. Fuel cost for infra-red amounted to $667.50 per year, as compared with $1479 per year required for vented gas unit heaters. In this building, 604 Btu/cu ft mixed gas at 3-in. water column pressure is used successfully.

*Graco Steel Co.*, Louisville, Ky., warms a one-man work station in its large steel warehouse with one portable over-desk gas infra-red generator which provides working comfort in a limited area without waste.

*Ohio Manufacturers and Fabricators Co. Inc.*, Elyria, Ohio, heats a 6000-sq ft steel Butler building that opens on two sides into a 1.3 million sq ft unheated warehouse and welding shop. Thirty overhead gas infra-red generators provide comfortable warmth for operating personnel.

*Rolled Steel Products Co.*, Houston, eliminates corrosion in steel warehouse stocks caused by moisture condensation when humidity rose to 85 per cent during the night. Gas infra-red generators, operating three hours per night, maintain steel temperatures well above dew point.

*Toledo Lakefront Dock*, operated jointly by the Baltimore & Ohio Railroad and the New York Central Railroad, uses gas infra-red to speed cold weather unloading of frozen coal in gondola cars. Tubular "gun burners" previously used thawed one car per hour; gas infra-red generators thaw a car in 7 minutes.




Building construction determines mounting arrangements for gas infra-red generators. Ridge roof, monitor, sawtooth and quonset-type buildings are shown here. Where building structure, machinery placement, cranes and height limitations prevent placing units on an overhead plan, they can be mounted at an angle from a wall.

*Detrex Corp.*, Detroit, uses gas infra-red generators to dry steel sheets after washing in an alkaline solution. Sheets were formerly oven dried at 450°F for four minutes and then allowed to cool. With infra-red, sheets are dried in 30 seconds and can be handled immediately.

As can be seen from the last three examples, gas infra-red has shown promise in a broad range of industrial process heating applications, aside from its tremendous high-bay heating potential. Heating engineers are convinced the new gas infra-red generators represent a significant advance in the concept of "space" heating, and that it will play an important role in the process heating technology of tomorrow. ■

## WHAT IS INFRA-RED ENERGY?

Infra-red rays have wave lengths longer than those of visible light and shorter than radio waves. They are waves of energy produced by the sun, a fire or by a heated object. These rays are waves of force in space. The force, partly electric and partly magnetic, is called electromagnetic energy. Infra-red waves are a member of the electromagnetic family of waves. All members of this family have the same characteristics:

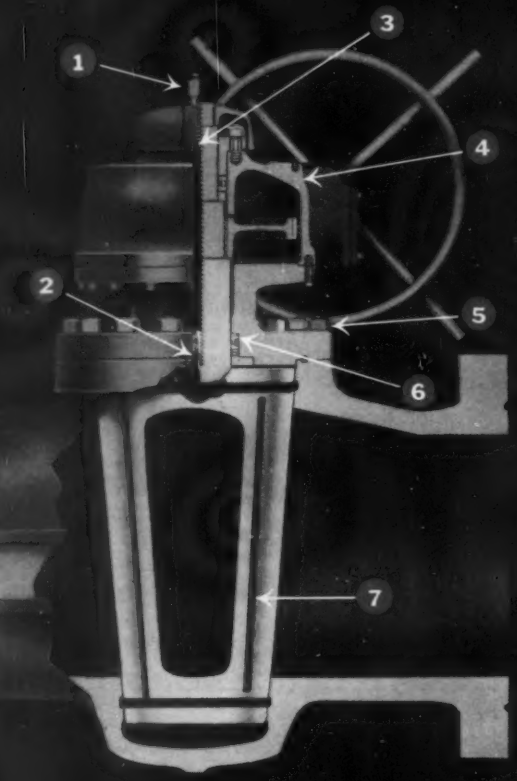
1. They all travel in straight lines at 186,000 miles per second. They do not affect the bodies through which they pass, only those which absorb them.
2. They can be reflected with mirrors or focused with lenses.

The sun, original source of nearly all the energy used by man, produces its infra-red energy by gas combustion. The newly developed technique described in this article uses the same system to produce controlled far infra-red heat energy.

Light is often described by its color. Infra-red is described in a similar manner as far infra-red and near infra-red. Near infra-red comes from that part of the spectrum nearest to light. Near infra-red which is produced by conventional infra-red electric bulbs does not have as great heat strength as far infra-red because much of the energy is light.

Far infra-red is produced by lower temperature sources than near infra-red. Because the new gas technique converts most of its fuel into far infra-red energy in wave lengths readily absorbed by most common materials, it is an efficient and economical generator of heat energy.

# 7 characteristics that make WALWORTH a better Lubricated Plug Valve




1. Valve can be lubricated with a Walworth High Pressure Lubricant Gun without removing lubricant fitting.

2. Double ball check valve prevents line pressure from getting into lubricant system.

3. Groove, cut part way up side of lubricating fitting, provides extra safety feature by allowing operator to note any tendency of lubricant to blow out **before** fitting is entirely removed.

4. For buried pipelines—gear housing design permits simple attachment of lubrication and handwheel extensions without modifying the gearcase.

5. Standard bolt threads, rather than fine threads, means easy replacement of nuts and bolts from local stocks.

6. Two overlapping Teflon* packing rings form an effective seal against possible leakage without "grabbing" the plug shank. Low break-out torque—plug turns easier.

7. Vertical and circumferential lubricant grooves completely frame the port openings, assuring a tight seal against leaks.

*Du Pont registered trade-mark

Cutaway of a 24-inch Walworth Lubricated Plug Valve

## you always know that a WALWORTH LUBRICATED PLUG VALVE will operate

No matter when you need it, you can count on a Walworth Lubricated Plug Valve to operate easily and dependably in handling gas, crude or finished products. In petroleum service throughout the world, these valves have long proved their complete dependability and easy maintenance. Other Walworth products, designed and manufactured especially for the oil and gas industries, include Gate, Globe, Angle and Check Valves. Sold by distributors in principal centers throughout the world.

**WALWORTH**

*750 THIRD AVENUE, NEW YORK 17, N. Y.*
*DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD*

***WALWORTH SUBSIDIARIES:*** ALLOY STEEL PRODUCTS CO. • CONOFLOW CORPORATION • GROVE VALVE AND REGULATOR CO. M&H VALVE & FITTINGS CO. • SOUTHWEST FABRICATING & WELDING CO., INC. • WALWORTH COMPANY OF CANADA, LTD.

# "The response has been overwhelming . . ."

...Now!
Traditional Charm
IN A MODERN MANNER
GAS LIGHTS...
1958
. . . on Patios
. . . along Driveways
. . . Porch Lighting
. . . Step Lighting
Picturesque and practical . . . Softly-glowing GAS Lights. They reflect the nostalgic charm of America's "gaslight era" but offer modern outside illumination.
Use them on porch or patio, along sidewalks or swimming pools, driveways, anywhere. . . .
Soft-as-moonlight, never-harsh light from Gas . . . a mark of the owner's taste for both modern and traditional beauty.
Available Now From Your Gas Company. Call our Lighting Department today. Be The First With The Newest.

IN the words of the man who heads one of the most diversified operations in the gas industry, the interest in the charm of gas lights is surprising.

W. R. Stephens, who heads the vast operations of Arkansas Louisiana Gas Co. and is chairman of the board of Arkla Air Conditioning Corp., made the statement following publication of the ad shown here.

This single ad appeared in newspapers throughout Arkansas Louisiana's system. It offered outdoor gas lights to the 240,000 domestic customers of the company in the three-state area of Arkansas, Texas, and Louisiana.

And, "the response has been overwhelming."

"It has opened up to us a whole new viewpoint as to the possibilities of building a gas load with what was considered a 'dead' gas appliance," Mr. Stephens said. The response was so terrific, in fact, that Arkla Air Conditioning has begun quantity production of outdoor "Gaslites" at the plant in Evansville, Ind. ■

Some months ago GAS ran the accompanying photo taken in private driveway in the Shadyside section of Pittsburgh. Residents in the area, served by Equitable Gas Co., consider the gas lights a link with a bygone era of pleasant living. The 13 families living in the area even organized an association to maintain them. Two private patrolmen light the beacons every night.

# GAS · DISTRIBUTION NEWS

## Consumers' plans service for 20 towns this year

Early this summer Consumers Gas Co., Toronto, will start construction of facilities that will provide natural gas service in about 20 communities this year.

In the area north and west of Toronto, these communities will get gas: Barrie, Stayner, Collingwood, Thornbury, Meaford, Owen Sound, Victoria Harbour, Midland, and Penetanguishene. The main 8-in. Georgian Bay transmission line will start from the Trans-Canada sales station north of Barrie and run to Owen Sound. Other transmission lines will serve Victoria Harbour, Midland, and Penetanguishene.

Completion date is set for Aug. 31. Construction of distribution systems within the towns will take place right along with construction of the transmission lines. With Trans-Canada planning to build its line north from the Toronto Junction to Orillia, natural gas would be available in Barrie and the Georgian Bay communities this fall.

In the eastern Ontario district, one 8-in. transmission line will run from Brockville, which is already receiving gas from Consumers', to serve Smiths Falls, Perth, Carleton Place, Almonte, and Arnprior, with Pembroke and Renfrew to be served from the same line. In this section completion date for both distribution and transmission systems is set for about Nov. 1.

Another transmission line will be built from the Trans-Canada line to serve Alexandria, Vankleek Hill, and Hawkesbury. Completion date: Nov. 1.

Some 45 representatives of refrigeration equipment manufacturers observed demonstrations of a unique experimental air conditioning unit at Battelle Memorial Institute, Columbus, Ohio, recently. Invited by the AGA to the demonstration are these representatives who are inspecting the experimental 3-ton residential air conditioning unit which operates on the so-called "free-piston" principle and is powered by natural gas. The unit, according to technologists, promises important fuel savings and efficiency in home air conditioning equipment. The demonstration unit is the result of a research and development program, now in its third year, being sponsored at Battelle by the American Gas Association.

## Columbia's realignment program progressing

Another step has been taken by Columbia Gas System in its two-and-a-half-year old reorganization plan.

Under recent applications filed with the FPC Manufacturers Light & Heat Co., Pittsburgh, would sell to the Ohio Valley Gas Co. its facilities used in its retail business in Ohio.

The Public Utility Commission of Ohio already has approved the purchase by Ohio Valley of the retail facilities used by United Fuel Gas Co. Applications for approval of this transaction are pending before the FPC and the SEC.

Ohio Valley will be a natural gas public utility operating solely within the state of Ohio and subject only to the jurisdiction of the Ohio PUC.

As a later step in the system's realignment plan, it is expected that the retail businesses of Ohio Fuel Gas Co. and Ohio Valley will be combined to form the system's statewide retail company.

The reorganization move was made by Columbia Gas to make each operating subsidiary subject to only one regulatory body and thereby ease and cut the costs of this regulatory supervision.

Under the program, all of the company's retail distribution properties in New York have been combined into a single company, Columbia Gas of New York Inc. Similar properties in Kentucky have been combined into Columbia Gas of Kentucky Inc. The program also will be extended to Columbia's subsidiaries in West Virginia, Pennsylvania and Maryland.

Following completion of the two steps involving Ohio Valley, that company will buy gas at wholesale from United Fuel for distribution in two counties in the southern part of the state. Additional gas will be bought from Manufacturers for distribution in five eastern counties. Interstate transmission facilities of United Fuel and Manufacturers will continue to be subject to FPC regulation.

## City urges gas use for power plants

The New York City Commissioner of Air Pollution Control has proposed that natural gas be substituted for coal in power plants to "control an excessive amount of smoke, fly-ash and sulfur dioxide."

Dr. Leonard Greenburg testified before the FPC that the substitution is required "for the welfare of the people in our community." He urged the FPC to grant a request by Transcontinental Gas Pipe Line Corp. to move more gas into New York for generation of electric power and steam by Consolidated Edison.

The additional gas would be used to fuel a Con Edison plant at 14th St. and the East River and one at 40th St. and First Ave.

Since Jan. 1, 1953, Dr. Greenburg noted, Con Edison has spent about $38 million in a program of air pollution control. But the problem remains.

Short of replacing boilers at a cost of about $12 million and about four years' time, there appears to be no other practical solution for the control of these boilers than the conversion of them to natural gas, Dr. Greenburg declared.

## U. of West Virginia site of corrosion short course

The third annual meeting of the Appalachian Underground Corrosion short course will be held at

the University of West Virginia, Morgantown, on June 10-12. It is expected that last year's record attendance of 450 will be passed.

In addition to the basic and intermediate courses on the subject of underground corrosion, this year's program will include laboratory work. These lab courses are designed to not only show practical demonstrations but to include student participation.

Among instructors are W. H. Stewart, president of the NACE, who is the keynote speaker; Dr. Carl G. Deuber, M. C. Miller, William J. Kretzchmer, G. C. Cox, Lewis H. West, Charles C. Stoneking, Joseph Schauers, and W. H. Hosford.

Included in the 1958 course are special, timely subjects such as the progress in the use of epoxy coatings and discussions on microbiotic deterioration of engineering materials. To date, 35 firms plan to exhibit their products at the school. Several short movies of corrosion interest will be shown during the evenings.

Additional information on the school is available from J. H. Royston, P. O. Box 11312, Pittsburgh 38, Pa.

## Columbia's management workshop announced

Applications are now being accepted for Columbia University's Utility Management Workshop. The workshop, scheduled for July 27-Aug. 8, is directed by Prof. Robert T. Livingston, under the sponsorship of the Department of Industrial and Management Engineering.

Now in its seventh year, the workshop is designed specifically to meet the needs of executives in the public service industry. It aims at the development of creative managers better equipped to handle complex and shifting problems.

This year the program concentrates on two areas: (1) the job of the manager and (2) the development of staff and assistants.

## Major promotions back air conditioning drive

Hard-hitting promotion campaigns for both domestic and commercial air conditioning are being launched.

The American Gas Association and Arkla Air Conditioning Corp. report that more than $200,000 will be spent this year in leading consumer and building trade magazines to boost all-year gas air conditioning. This massive program will generate more than 60 million sales messages. Magazines slated to carry the message include *American Builder, House & Home, Practical Builder, House Beautiful Building Manual, House & Garden's Book of Building, New Homes Guide, Today's Home, Living for Young Homemakers, House Beautiful, Good Housekeeping,* and *Life.*

AGA has published a how-to-do-it booklet entitled "Steps to Success," which provides utilities with detailed plans of action for launching and conducting air conditioning programs.

First demonstration to the gas industry of Caloric Appliance Corp.'s new gas-fired, household garbage disposer is made by Leroy Klein, vice president-sales, to Florida state and local fire officials and representatives of the gas industry in southeast Florida. Demonstration was made at headquarters of Peoples Gas System in North Miami.

Ted Garrity (left), Northern Illinois Gas Co.'s western division manager, and Miss Lois Bauer, home service advisor, crown the Penny Flame Cherry Pie Queen, Judy Burnidge of Elgin. The high school senior won a $400 scholarship which she will use when she enters college next fall to major in home economics. Miss Burnidge won out over seven other finalists in the contest held throughout Northern Illinois' 20-county service territory.

Managing Director C. S. Stackpole points out that central air conditioning sales will climb to an estimated 220,000 units this year, an increase of nearly 60 per cent over 1957. Sales in 1961 are expected to reach 600,000 units, more than four times last year's volume. "With an aggressive sales program," Mr. Stackpole said, "the gas industry can get a major share of this highly profitable load."

The 84-page booklet presents step-by-step plans for companies just beginning their air conditioning sales and service programs, as well as valuable data for utilities expanding their present programs.

Also announced is the large-volume gas air conditioning sales and promotion program backed by the air conditioning and heating committee of the AGA industrial and commercial gas section.

The portfolio sets forth, step by step, how to organize an air conditioning sales force and how to lay the groundwork for this once-in-a-liftime opportunity. Presented are plans for developing sales, an information letter on large volume gas air conditioning, case histories, operational studies and testimonial reports, and feasibility studies.

## Ohio's specialists sell air conditioning

Ohio Fuel Gas Co., Columbus, has 35 air conditioning specialists stationed at strategic locations

**Built-in Carrier Wire Assembly Makes**

ACCURATE ADJUSTMENTS
. . . faster . . . easier

Lancaster S-700
DIAPHRAGMS
*for 1-A sprague gas meters*

Simply adjust the center pan screw and you're sure of smooth floating action and a perfectly centered swing every time.

Integral part of Lancaster S-700 and S-700-L (Synthetic) Diaphragms, the adjustable carrier wire assures perfect centering in meter with featherweight floating action.

Gasket is already cemented to rim —no hole aligning. Test it Yourself!

WRITE TODAY FOR A FREE SAMPLE:
PLEASE STATE LEATHER OR SYNTHETIC.



*"A Meter is only as Accurate as its Parts"*

*For Proper Meter Care Use These Lancaster Quality Products*

- Cork Gaskets
- Diaphragm Oil
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- Abrasive Paper
- Index Stuffing Boxes Grease and Packing
- Index Box Cement
- Index Repair Bushings
- Neoprene Connection Washers
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Lancaster METER PARTS CO.
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☐ Check herewith ☐ Bill me ☐ 2 years $3.00 ☐ 1 year $2.00

Name _____ Title _____
Firm _____
Street _____
City _____ Zone ____ State _____



throughout its 59-county territory. These specialists promote the sale of gas air conditioning equipment of all types in 100 major communities.

The experts, representatives of OFG's business promotion department, are trained to do a complete selling job. They give advice about layout, installation, and servicing. Sheet metal work is contracted from area firms, and financing—usually through local banks—is arranged by Ohio Fuel representatives.

The company also sponsors various model home promotions to help stimulate sales of homes equipped with gas air conditioning.

In promotions of this type, the company supports with personal counsel, advertising, news stories and pictures, those builders who construct homes where Ohio Fuel's gas service is available and who participate in the company's program featuring year-round gas air conditioning.

## McIlroy analyzer given to Massachusetts college

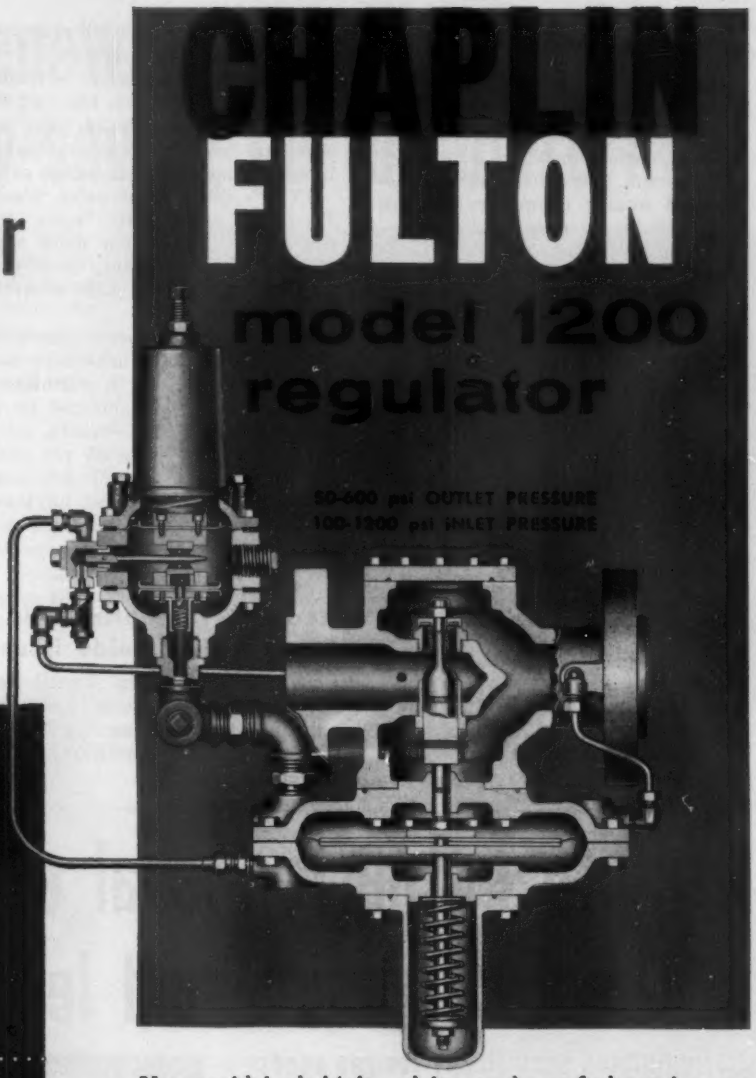
Standard Electric Time Co. donated a McIlroy fluid network analyzer to Western New England College. The analyzer will be used in the science building slated for

Signing Western New England College analyzer agreement are (seated, from left) R. W. Angier, secretary-treasurer, Standard Electric; Dr. Beaumont A. Herman, president of the college. Standing, from left: Leon D. Chapin, assistant to Dr. Herman; Mrs. F. W. Riggs, president, and R. C. Moore, head of analyzer section of Standard Electric; and R. R. Emerson, chairman of the board of trustees for Western New England.

# '1200'

# A good number to remember

## gives widest range control... no other like it!




- Ready for installation . . . no field connections needed
- All-steel construction . . . stainless steel trim
- Pilot loaded for accurate control
- Large capacities 529,000 cfh at 800 psi inlet

SPECIFICATIONS

Single seat valve with molded in place disc—balanced against inlet pressure thrust.

*Size*—2" flanged Series 60 (Series 30 Optional)

*Working Pressure*—1200 psi (Series 30-600 psi)

*Outlet Pressure*

| | |
|---|---|
| With Type 51 Pilot | 50-150 psi |
| Type 52 Pilot | 50-300 psi |
| Type 53 Pilot | 50-600 psi |

*Face-to-Face*

| | |
|---|---|
| Series 60 | 10½" |
| Series 30 | 9¾" |

for complete information write for bulletin 1200

**You could look high and low and not find another gas regulator like this Model 1200 in the business. It's compact and self-contained, designed for rugged high-pressure service with Chaplin-Fulton accuracy. No field connections needed—a 2" integral unit ready for installation. Actually, this Model 1200 is an all-steel version of our widely accepted Model 1100 . . . now ready to help solve your high-pressure problems.**

ACCURATE CF MFG CO DEPENDABLE

WSW 6834

Chaplin-Fulton

MANUFACTURING COMPANY

Pittsburgh 25, Pennsylvania

construction on the college's new campus in Springfield, Mass.

The gift will serve several purposes: Students will use it to study the design, operation and application of analog computers; it will be available to municipal or commercial companies on a rental basis for working out problems; and it will be available to Standard Electric for similar computations.

The new science building is one of three new ones planned by Western New England College in the next five to seven years. Being one of only four universities with a computer has given the college quite a boost towards becoming established on its new campus.

## Newspaper ads in color increase range sales

Ten key management executives from Philadelphia Gas Works—one of the first firms ever to use full-color appliance ads in daily newspapers—were given some behind-the-scenes information on the creation of an advertising campaign and the impact of the full-color ads.

The advertising and public relations agency of Arndt, Preston, Chapin, Lamb & Keen, Inc. told the gasmen that newspaper color advertising has done a great deal to increase matchless gas range sales.

PGW's director of sales, Frank Trembly, said that "color has proven its value with more than 50 per cent readership over conventional black-and-white advertising."

The account manager handling Philadelphia Gas Works said that a recent 4-color ad in a Philadelphia newspaper was noticed by 61 per cent of female readers, associated with PGW by 35 per cent, and closely read by 27 per cent. "We could never expect anything near this result with black-and-white advertising," he said.

## Heating, Ventilating, Air Conditioning Guide issued

The 1958 Heating Ventilating Air Conditioning Guide has been published by the American Society of Heating & Air-Conditioning Engineers.

This year's edition contains a 1272-page technical data section and a 503-page catalog data section. It is the largest annual edition published in the 36-year history of the book.

The catalog data section follows the pattern of other editions, but the equipment data have been brought up to date. The pages contain both descriptive and performance information as well as application data.

Revisions and additions have been made in the following chapters of the technical data section: Air Contaminants; Cooling Load; Fuels and Combustion; Automatic Fuel Burning Equipment; Heating Boilers, Furnaces, Space Heaters; Radiators, Convectors, Baseboard and Finned-Tube Units; Central Systems for Air Conditioning; Air Duct Design; Air Cleaning; Refrigeration; Electric Heating; Industrial Exhaust Systems; Industrial Drying Systems; and Codes and Standards.

Additional information on the guide is available from the society at 62 Worth St., New York 13. Single copy price of the publication: $12.


# use-proved perf-a-seal epoxy cuts costs of corrosion and leak control

**...formulated specifically for gas needs**

**This actual-use photo shows how quickly and economically gas pipe leaks can be patched and corrosion can be controlled with PERF-A-SEAL, strongest sealant yet. Formulated specifically for gas needs, this reinforced, quick-curing epoxy compound is recommended by top firms because PERF-A-SEAL combines highest tensile, highest impact, highest burst-strength, maximum corrosion-resistance.**

**STRONGEST SEALANT YET**

*Supplier to America's Leading Gas Distribution Companies*

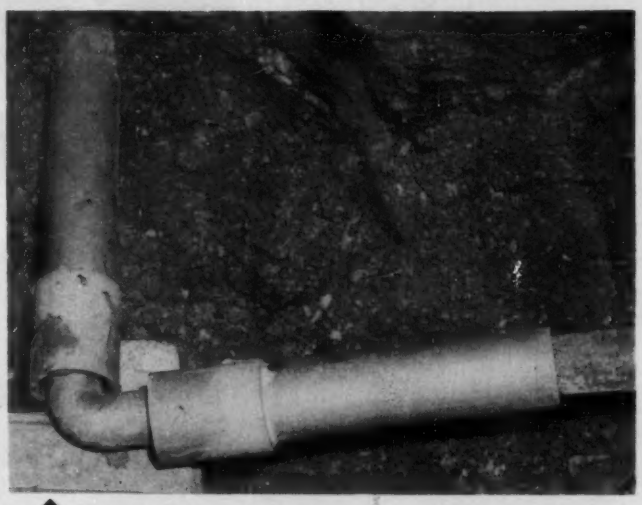
**perfex plastics inc.**
2632 S. DEARBORN ST., CHICAGO 16, ILL.

# safe, sure renewal service with money-saving perfex materials

These photos show plastic pipe and other materials in actual installations of a major gas distribution company. All are products of Perfex Plastics, specialists with long experience in the low-pressure renewal service field. Each product is held to specifications, precision-engineered with close tolerances—your guarantee of safe, sure service. For example:

### PIPE and COUPLINGS

Here a new section of 1.375 in. plastic pipe is being inserted into old 1.50 in. steel service. Perfex pipe is available in Tenite, Cycolac, P.V.C. or Kralastic. Inside couplings plus thinner and cement are also available for joining all four types of pipe.

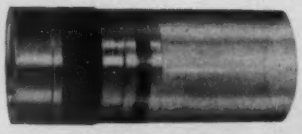


### PROTECTOR SLEEVE

Designed for maximum protection at the main where plastic pipe is inserted into old metal service. Scientifically engineered to assure safe, sure, long-lasting renewal life.

### HEAD ADAPTER

The strong link between metal and plastic service, patented by Perfex Plastics for economical, gas-tight headache-proof tie-in of the old and the new service. All parts of this head adapter are non-corrosive.



**FOR DEPENDABLE, EXPERIENCED ONE-STOP SERVICE, LOOK TO**

*Supplier to America's Leading Gas Distribution Companies*

**perfex plastics inc.**
2632 S. DEARBORN ST., CHICAGO 16, ILL.

## American Standards listed in new publication

Some 1723 voluntary national standards approved by the American Standards Association are listed in a new publication.

The 67-page booklet, "List and Index of American Standards," lists five types of American Standards. These are: (1) Definitions, terminology, symbols and abbreviations; (2) standards for materials, performance characteristics, procedure, and methods of rating; (3) methods of testing and analysis; (4) standards of size, weight, volume, and rating; and (5) standards of practice, health, and building construction.

Fields covered: civil engineering and construction, petroleum, electrical, photography and motion pictures, textiles, mechanical engineering, safety, ferrous and nonferrous materials and metallurgy, chemicals, acoustics and mechanical shock and vibration, mining, automotive, rubber, and a miscellany of others.

Free copies of the list are available from Dept. DD-7, American Standards Association, 70 E. 45th St., New York 17.

This poster promoting gas heat was first-award winner for poster design in markets of 100,00-to-500,000-population division in the 6th annual local outdoor advertising contest sponsored by the Outdoor Advertising Association of America. It was displayed last year by the City of Richmond (Va.) Department of Public Utilities and Commonwealth Natural Gas Corp. Commonwealth is a repeat winner, having taken first prize in the 1956 and 1957 contests also.

REYNOLDS
NRT-8010 SERIES
*New House Service Regulator*
NEW ALUMINUM BODY AND TOP
CAST IRON INLET UNIT
V-TYPE STAINLESS STEEL BAND

ONLY ONE STAINLESS SCREW with nut to remove for complete orifice and valve pocket. Permits exchange of diaphragm case without removing inlet unit from line.

*Supplied as:*

1. No seal type
2. No seal type with automatic cutoff
3. Internal diaphragm operated relief valve for complete over pressure protection
4. Internal diaphragm relief and automatic cutoff

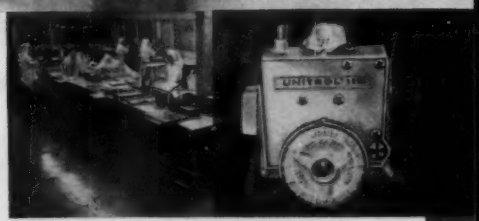
REYNOLDS
REGULATOR CO.
ANDERSON, INDIANA

## GAS • News Notes

*New York's PUC* reports that in 1957 public utilities sought rate increases totaling some $83.9 million. Of this, $56.2 million was allowed. An "inflationary tide" is pushing operating costs of utilities higher and will make it hard to hold the line on rate increases, the commission said in its annual report. "In the face of mounting prices all

*From its modern $10,000,000.00 plant in Long Beach...*

## Robertshaw enters the manufacture of Central Heating Controls!



* **Exacting Quality Control**—a proved factor in the successful development and production of millions of dependable water and space heater controls.

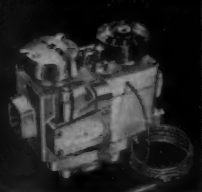
**Unitrol 110**—the standard of the water heater industry... more than 3,000,000 controls produced and sold with less than one-half of one percent returns.

**TR Wall Thermostat**—dependable comfort control for the home ..."fashion-right at home" in any decor!

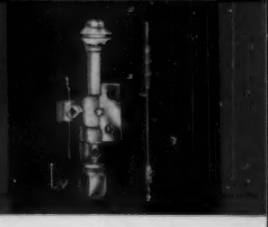
**FAL 400 Fan & Limit Control**—Compact, easy to install ... Fan & Limit Control settings adjustable.

* **Exacting Quality Control**—now lends its technique to the manufacture of Central Heating Controls and Accessories!

**Unitrol 1000**—interchangeable cartridges convert basic unit from manual to automatic or wall thermostat operation.



**#9 Pilot and Super-Clad Thermocouple**—An unbeatable combination for positive, safe operation.



*Dependable Robertshaw controls are advertised nationally to your customers in Good Housekeeping, American Home, Sunset and Saturday Evening Post.*

CONTACT:

**Robertshaw-Fulton** CONTROLS COMPANY

GRAYSON CONTROLS DIVISION, LONG BEACH, CALIFORNIA

along the line . . . it will be impossible to resist indefinitely the increase in the cost of all utility services," it said.

*A compromise* 4 per cent franchise tax on gas and electric utilities has been enacted by the New Hampshire legislature. The new tax—expected to yield $637,000 a year—will be in effect for two years while a committee studies the issue of utility taxes and prepares recommendations for a permanent levy. A former levy yielded $540,000.

*Dravo Corp.* has bought the shops and land of Pittsburgh Screw & Bolt Corp.'s Graham Works on Neville Island, Pittsburgh, for $787,500. The property includes about 40 acres of land, 260,000 sq ft of shop floor space, and 7000 sq ft of office floor space. Dravo already owns approximately 125 acres on the island.

Engineers look over Peoples Natural Gas Co.'s new electronic digital computer recently installed by the Pittsburgh company. Exploring its merits are (clockwise) Henry McCain, operator; Jack Livingston, planning engineer; John Roulic; Howard M. Joiner, chief engineer; Ronald Wiley, and Joseph Sheehan. The Royal McBee L.G.P. 30 is capable of analyzing a moderate-size service area in a 6-hr period.

*The Saskatchewan towns* of Estevan and Weyburn will benefit from the $16 million expansion program of Saskatchewan Power Corp. New distribution systems are planned for both towns in 1958. Gas will come from a plant in the Steelman field.

*A new* "Safety Code for Inspection, Maintenance and Protection of Fixed Foam Systems" is available from the Fire Equipment Manufacturers Association, Suite 759, One Gateway Center, Pittsburgh 22.

*Rockland Light* & Power Co., Nyack, N. Y., and Orange & Rockland Electric Co. have merged into Orange & Rockland Utilities Inc. Chairman Rockwell C. Tenney said that "This consolidation . . . will result in better service to the adjacent, fast-growing territories of both companies."

*Kimray Inc.*, Oklahoma City, has appointed Davis-Marler Co. executive distributor for Kimray products in northern Louisiana, southern Arkansas, and east Texas. Davis-Marler maintains offices and warehouse in Shreveport.

In your expansion and new construction plans include

# GAS INSURANCE

The efficiency of your company is only as reliable as your source of fuel. When peak loads overtax your facilities, the finest administrative and operating techniques are no substitute for GAS.

**Draketown Propane Plants** have enabled almost a hundred leading utilities to "insure" their fuel supply. Some have had their investment pay for itself during one short period.

Send for further information on how you can have these extra "Ms" you need for peak shaving to reduce high demand charges. Ask for booklet, "Modern Fuel Supply."

DRAKETOWN

PROPANE PLANTS by
**Drake & Townsend** Incorporated
11 WEST 42nd ST., NEW YORK 36, N. Y.

*(In Canada)*
DRAKETOWN-JAMES LTD.
70th Ave., & MacLeod Trail
Calgary, Alberta

*(Overseas)*
DRAKETOWN INTERNATIONAL CORP.
11 West 42nd Street
New York 36, N. Y.

GAS CONSULTING • DESIGN • ENGINEERING • CONSTRUCTION

*Members: American Gas Assn., LP-Gas Assn., American Petroleum Institute, National Fire Protection Assn., Canadian Gas Assn., Agricultural Ammonia Institute*

*J. A. Halpine & Son*, Tulsa, is handling sales of Electro-Span digital supervisory control systems in the Oklahoma, Kansas, and Missouri area, according to the Pacific Division of Bendix Aviation Corp.

*Ohio Fuel Gas Co.* recently opened its new Westerville (Ohio) office. The completely air conditioned building is a one-story structure containing office quarters, garage storage for automotive equipment, and warehouse storage for equipment.

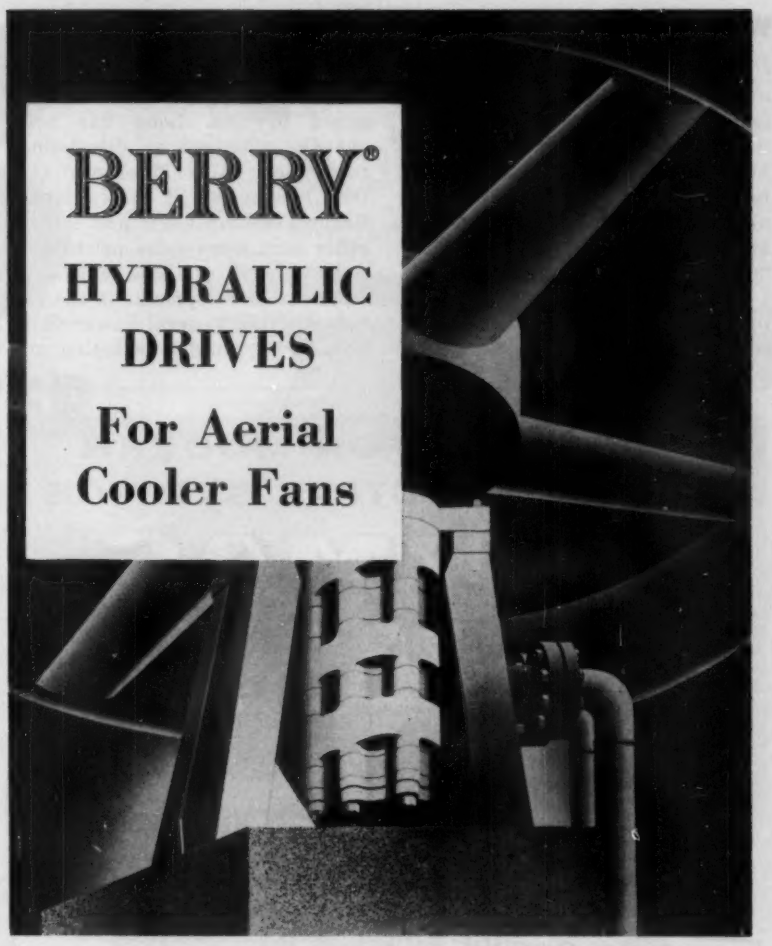
*A new company*, California Chemical International Inc., has been formed to take over the expanding export market of Oronite Chemical Co., San Francisco. T. G. Hughes is president of the new company, which, like Oronite, is a Standard Oil Co. of California subsidiary.

*Research studies* of the influence of port design and gas composition on flame characteristics are described in a recent publication issued by the AGA Laboratories. Bulletin 77 covers research performed at the Labs under Project DA-1-GU.

*Atlanta (Ga.) Gas Light* Co. is going to expand its LPG storage facilities by some 3.7 million gal. Planned for construction are two additional tanks at the Riverdale plant, each with a capacity of 1.3 million gal.; nine new tanks at the Jonesboro unloading station, plus 26 tanks at the Rome, Macon and Augusta facilities. All tanks will have capacities of 30,000 gal. each.

*The January 1958* issue of the AGA Laboratories Directory of Approved Appliances and Listed Accessories has been published. It lists all gas appliances and accessories in current production which have been tested and approved by the Labs. The directory is issued in complete form semi-annually for the months of January and July.

*After close* to 100 years of appliance merchandising, Portland (Ore.) Gas & Coke Co. has withdrawn from the field. The responsibility for appliance sales has been turned over to the gas appliance dealers in the area. The company will continue to develop prospects for dealers who display, advertise, and sell new gas appliances.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**constant water temperature** • The Berry drive makes it possible to maintain a predetermined jacket-water temperature accurately and automatically.

**safe** • The Berry hydraulic system has the safety necessary for gas transmission equipment and can be located in compressor building at point of use.

**simple, trouble-free** • Fan may be mounted directly on Berry hydraulic motor shafts, and the pump may be direct or belt driven from compressor flywheel.

**saves power** • With the Berry hydraulic drive, horsepower used to drive fan is proportionate to the cube of the speed of the fan. Whereas with a mechanical drive, the horsepower remains constant.

**complete** • System may be designed to integrate compressor and auxiliaries into a packaged unit. Compressor unit may be moved from location to location as needs increase or decrease, without interrupting station operation.

**adaptable** • With Berry's "stacking" design, *one* Berry hydraulic pump can provide power for a number of Berry motors under various oil flow and pressure requirements.

**low overall investment** • The integrated hydraulic drive, powered from compressor, eliminates hazardous electrical equipment and additional buildings necessary.

**fully automatic** • When untended service is a "must," Berry drives can be integrated with other controls to provide automatic compressor stations.

See how Berry fills your needs.

*Write for this 8-page bulletin which gives full data on Berry pump/motor "package" units.*

BERRY HYDRAULICS

A DIVISION OF OLIVER TYRONE CORPORATION
PITTSBURGH 22, PA.

## Washington • *Cont'd.*

*from page* 17

over the past four years with gas legislation.

In a sharp letter to Gov. G. Mennen Williams of Michigan, a fellow Democrat but a bitter opponent of the gas bill, Rep. Harris answered charges that it was a "consumer gouge" measure.

Briefly, he said it would not free producers from regulations nor result in increased gas prices, but would make more gas available and halt a monopolistic trend among production facilities.

The exemption measure proposed by Sen. Long has been sharply criticized as discriminatory. Sen. Mike Monroney (D., Okla.) compared it to regulating General Motors Corp. and letting other auto firms raise prices.

As a result of these legislative and court developments in the gas industry, the Federal Power Commission is rapidly assuming the role of a reluctant dragon.

The commission has been hopefully awaiting either court or legislative action for years to get out from under the tremendous regulatory burden imposed by the original Phillips decision placing independent producers under federal regulation.

It has announced that it won't follow the lower court decisions in the Memphis case until it is either reviewed by the U. S. Supreme Court or clarified by legislation.

Neither of these "outs" now appear likely in the immediate future.

The results are somewhat chaotic. One FPC hearing examiner recently ignored the FPC's policy, and turned down a rate increase (Michigan Wisconsin Pipe Line Co.) he found just and reasonable on the grounds that the Memphis decision prohibited unilateral rate changes under Section 4. Other examiners have followed FPC policy and ignored the Memphis case.

Some pipelines are busily trying to negotiate agreement of their customers for rate hikes to follow the Memphis ruling. Others are ignoring the Memphis case.

Under the Phillips decision, the commission has suspended more than 1100 price increases sought by independent producers. The cost of these increases is more than $50 million.

But as yet no general rate of return has been set for producers. They are not being required to file periodic cost data under a uniform accounting system like their cousins, the pipelines. This, FPC chairman Jerome Kuykendall told Congress recently, would be impossible because expert personnel are not obtainable.

Cost figures from producers on an individual basis in individual rate cases are being requested, however.

But with a congressional investigation facing the commission after the House Commerce Committee finishes with the Federal Communications Commission and the Civil Aeronautics Board, the FPC is going to be forced into accepting more and more regulatory functions concerning gas producers and pipelines. ■


THE *FINEST* FOR MODERN GAS DISTRIBUTION SERVICE

NORMAC

Malleable Couplings

Normac Insulating Malleable Couplings and fittings are available with polyethylene inserts and semi-insulating gaskets or full insulating rubber gaskets.

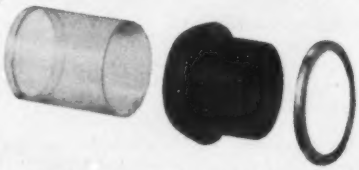
*Insulating* Couplings AND Fittings

Malleable Service Ell

The insulating principle depicted above is carried out in all Normac Ells and Tees.

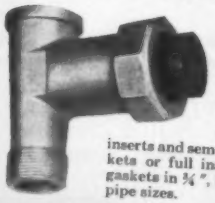
**NORTON McMURRAY** has specialized for 20 years in the development and production of products solely for the Gas Industry. Whether your plans include modernization, or new, expanded facilities, Normac Gas Distribution Equipment will serve you well.

Insulating Gaskets



The Normac insulating principle incorporates an efficient combination of a polyethylene sleeve and a semi-insulating gasket or full rubber gasket and retainer ring.

Brass Fittings



Normac insulating Brass compression end Tees, Ells and all compression end fittings are available with polyethylene inserts and semi-insulating gaskets or full insulating rubber gaskets in ¾", 1" and 1¼" iron pipe sizes.

*New* CATALOG

Write for your copy . . . it gives complete details and specifications of NORMAC equipment.

NORTON-McMURRAY Manufacturing Co.

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**2** **Tough, Nylon insulation** — high mechanical strength prevents crushing — seals tight — high dielectric strength eliminates electrolysis.

**3** **Interchangeability** — insulated meter connections are interchangeable with standard connections — will accept standard caps and washers reducing inventory problems.

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Here's the new, easy-to-use, money making sales plan that helps you sell the big replacement, home modernization and new home markets. Get fast sales pick-up and Ac-SELL-erate your sales all year round.

Complete line of glass-lined and galvanized models. Fully guaranteed.

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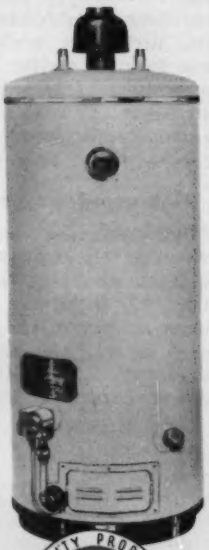


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**JOHN WOOD COMPANY**

**Heater and Tank Division**
Conshohocken, Pennsylvania
Chicago, Illinois

# GAS DIGEST

## New Products and Trade Literature

***For more data on any of these items use***

***the Readers' Service Card on pages 103, 104***

### 1. Gas main cleaner

Main-O-Vac is a materials handling system which has been adapted especially for the gas industry's cleaning requirements. It is a high-pressure, portable, three-stage turbine-type pneumatic unit. According to the company, it cleans dust, dirt, rust scale and other loose foreign matter from mains up to 1000 ft long in less than 1 hr.
*Dunbar Kapple Inc.*

### 2. High-speed water heaters

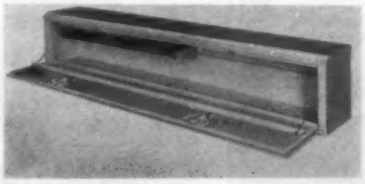
High-speed gas water heaters with relatively small storage tanks are featured in the Ruud line for 1958. All tanks are non-ferrous (Alcoa aluminum alloy or copper-nickel alloy) and enameline or glass-lined.
*Ruud Manufacturing Co.*

### 3. Backhoe

A truck-mounted backhoe for Chevrolet ¾-ton trucks has been designed by Ottawa Steel to fit tight work schedules. The new trench-digging machine can work in one area in the morning and get to work at another job site miles away in the afternoon. A quick on-and-off feature of the backhoe leaves the truck free for other work when not needed for digging. When a trench has been completed in one area, the backhoe is hydraulically shifted up and over the rear axle of the truck. It is then driven at regular road speeds to the next job site.
*Ottawa Steel Division*

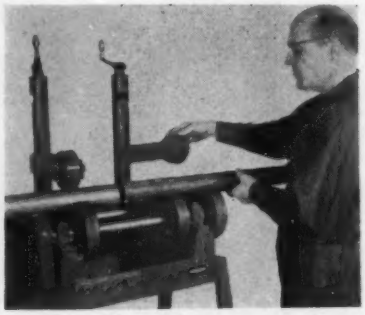
### 4. Seismic records

Minnesota Mining's duplicating products division has developed a new method for making extra copies of logs, charts and documents of special length. The process—which cuts both reproduction costs and copying time—involves a roll-paper adapter for use with Thermo-Fax copying machines to permit continuous flow copying.
*Minnesota Mining & Mfg. Co.*



### 5. Tool boxes

An improved line of tool boxes from Morrison Steel is designed to fit all makes of pickup trucks and to take all standard packaging of small parts and equipment. They come in three lengths—75 in., 90 in., and 105 in.
*Morrison Steel Products*



### 6. Pipe rotating machine

Faster and simpler welding of pipe up to 5 in. in diameter is made possible with a new pipe rotating machine, according to the Cecil C. Peck Co. The machine is said to be ideal for jobs where long pipe runs can be conveniently prewelded before erection. It is also useful in maintenance operations. A welding speed range of 7 to 14 in. per minute is obtained by adjusting the motor position.
*Cecil C. Peck Co.*

### 7. Solenoid valves

Hum-free, vibrationless operation is claimed by a new solenoid valve from Magnatrol. The Type T full-port, normally closed valve is for applications demanding such qualities. The valve has been designed to accommodate a wide variety of industrial and domestic applications, including automatic remote control of gasses used in space heating systems.
*Magnatrol Valve Corp.*

### 8. Aluminum meter

A new aluminumcase L.P. gas meter has been introduced by American Meter. It is designed to provide metered service for small commercial loads and medium-sized homes with LPG heating. The new meter combines extreme resistance to impact damage with a compact, light-weight design that facilitates setting and handling.
*American Meter Co.*

### 9. Surge protection

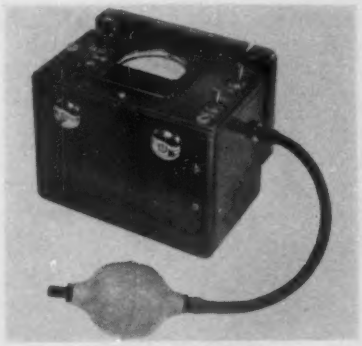
Union Switch & Signal's all-relay, self-checking system automatically protects pipelines and pumping system from dangerous line surges. Under normal operation, the system continuously sends, by carrier or direct current, a 120 pulse-per-minute code from the monitoring location to one or more upstream pumping stations. Another 180 pulse-per-minute code, located at the monitoring station but having no effect on the transmitter, constantly guards against line pressure surges.
*Union Switch & Signal*

### 10. Clothes dryer

A top-loading clothes dryer has been introduced by Fowler Manufacturing Co. The new deluxe dryer has a beveled front panel and a new fabric selector that permits drying from room temperature (no heat) to 175°. Other features include ultra-fast drying, with delivery of more than 140 cu ft of air per minute; and double suspension, permitting oversized cylinder to handle 19-lb loads.
*Fowler Manufacturing Co.*

### 11. Aluminum pipe wrench

The light weight of Schick's aluminum pipe wrenches makes them particularly suitable for overhead work and in those hard to reach places where fatigue from a heavy wrench can slow down a job or invite an accident. The company reports that the wrenches are approximately 60 per cent lighter than steel wrenches. They are available in six sizes—from 10 in. to 48 in.
*Schick Products*



### 12. Oxygen indicator

A new M-S-A portable oxygen indicator measures oxygen concentrations ranging from 0 to 25 per cent by volume with an accuracy within ½ per cent. The newly developed instrument occupies only 160 cu in. of space and weighs less than 6 lb.
*Mine Safety Appliances Co.*

### 13. Air heater

A new pebble-type air heater provides high temperature air for test chambers. The Hirt-designed gas burner heats the pebbles which in turn provide large volumes of high temperature gases. The burner comes equipped with pushbutton spark ignition, fail-safe combustion safeguard, and remote panel board operation with operating lights.
*Hirt Combustion Engineers*

### 14. Air meter

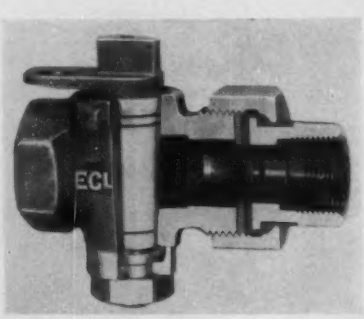
Dwyer's new air velocity and static pressure indicator simplifies a variety of air conditioning, heating, and ventilating equipment adjustments. The No. 460 air meter gives direct readings for furnace draft, pressure drop across air filters, duct air velocity, supply grille velocity, and return grille velocity.
*F. W. Dwyer Mfg. Co.*

### 15. Serrated flanges

Tube Turns Plastics has replaced its existing line of smooth-faced flanges with a line of concentric-serrated faces for polyvinyl chloride piping systems. Better gasket retention and a more effective seal, according to the company, are reasons for the change. It explains that by adopting concentric serrations, it eliminates the chance of a fluid traveling around the spiral grooves between serrations until it eventually leaks from the flange.
*Tube Turns Plastics*

### 16. Vise

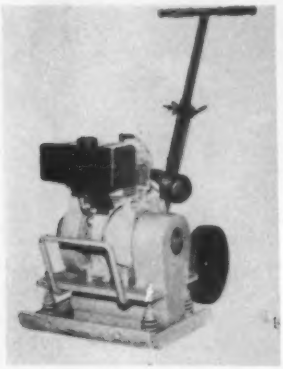
Toledo's No. 25 vise now features five jaws. According to the manufacturer, the ⅛-in. to 4½-in. capacity vise offers absolute grip, regardless of pipe or conduit size. Non-slip, integral pipe benders keep pipe from slipping. Evenly distributed contact points insure solid mounting.
*Toledo Pipe Threading*




### 17. Gas cocks

Eclipse Fuel's new line of Wedge-seal gas cocks incorporates an insulated union. The unit is designed

to combine shutoff with insulation against stray or induced house currents. The insulator is integral with the tailpiece and is used in compression only.
*Eclipse Fuel Engineering*

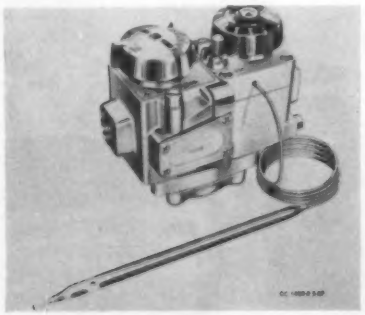


### 18. Vibratory compactor

The Powr-Pactor is a new self-powered vibratory compactor designed for quick, convenient compaction and grading of stone, gravel and granular soils. It is equipped with rollers and water feed attachment.
*Maginniss Power Tool Co.*

### 19. Multi-pass electrode

Multi-phase versatility has been added to National Cylinder Gas Co.'s Dual Shield carbon dioxide welding process with production of NCG 111-A spooled electrode. The new electrode meets requirements for both multiple and a single-pass welding of pressure vessels under ASM-AWS and ASME codes.
*National Cylinder Gas Co.*

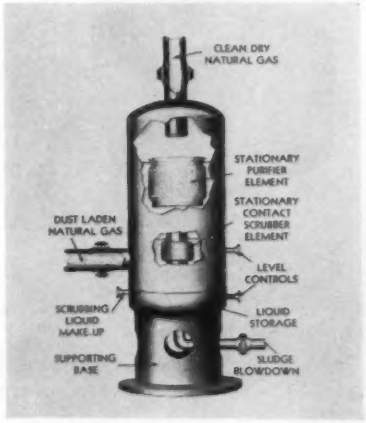


### 20. Heating control

Unprecedented versatility is claimed by a new combination control for gas heating equipment. The Unitrol 1000 can be easily converted from manual to either hydraulic bulb thermostat operation or an electrically operated room thermostat. Any of four units may be added to the basic Unitrol 1000. The basic unit provides for manual operation of space heating and central heating equipment.
*Grayson Controls Division.*

### 21. Forged steel valves

Lunkenheimer's new line of forged steel gate valves is built for easy installation in the most cramped quarters. The completely new valves feature the bolted-bonnet design with outside-screw rising stem, solid-wedge disc and rolled-in seat rings. They are available with screwed or socket welding ends in sizes ½-in. through 2-in. The valves are rated at 800 lb at 850°F, and 2000 lb at 100°F.
*Lunkenheimer Co.*




### 22. Scrubber

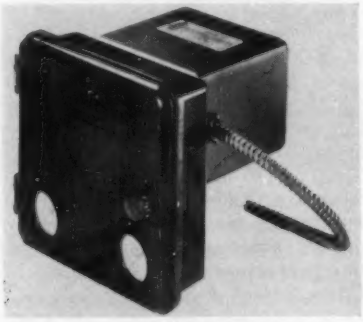
Exceptionally high degree of dust recovery is claimed by Anderson's new type Hi-eF scrubber, Type LDW. This multi-phase purifier accomplishes separation by employing impingement baffle, centrifugal force and wet scrubbing. It is designed specifically for use in gas transmission and distribution lines for separating fine dust particles out of the gas stream.
*V. D. Anderson Co.*

### 23. Lightweight breaker

A new lightweight breaker is especially suited for light demolition work, horizontal breaking, digging trenches, breaking frozen ground, or trimming. The 35-lb class breaker features a new latch-type steel retainer and a simplified swivel "O" ring air connection. It is available as a breaker, with a clay spade handle, or a trench digger handle.
*Le Roi Division*

### 24. Extra oven capacity

Extra baking and roasting capacity is provided by new over-size ovens on all 1958 Roper 30- and 36-in. gas ranges. According to the company, oven sizes are up as much as 43 per cent over previous models. In spite of their size, the new Roper ovens are said to be fast-heating and economical to use.
*Geo. D. Roper Corp.*



### 25. Remote-controlled drive

Fisher Governor's remote control drive Type 600W Kixcel is available for mounting on the Type 4100 Wizard pilot. The Kixcel is designed to meet the problem of distance between control valves. An electric signal actuates the Kixcel, which changes the Wizard set point to meet new flow requirements.
*Fisher Governor Co.*

### 26. Specification slide rule

Seventy pounds of diesel and natural gas engine catalogs and specification sheets have been referenced, digested and the pertinent information placed on a special computer. Produced by Diesel Dials Inc., this new instrument gives rating and application char-

# FOR MORE INFORMATION

## about New Products in this Issue . . . . .

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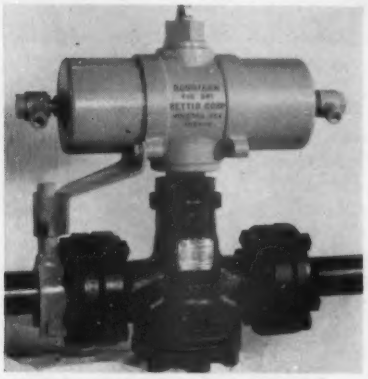
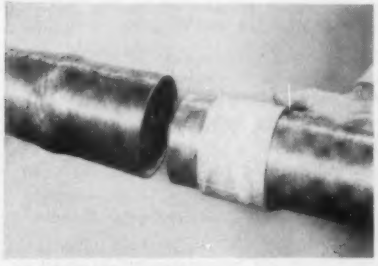
acteristics of all diesel and natural gas engines manufactured in the U. S. In seconds it is said to solve complicated engine computation and application problems and provide for corrections in altitude, temperature and generator efficiencies.
*Diesel Dials Inc.*



### 27. Plug-valve actuator

The Robotarm valve actuator is a rugged and compact gas- or fluid-operated actuator for operation of plug valves and other 90° rotating mechanisms. Standard models generate torque output from 3000 in. lb to 25,000 in. lb with 100 psi operating pressure. The new actuator incorporates a totally enclosed piston rack and gear assembly fully submerged in an oil bath.
*Bettis Corp.*



### 28. Reinforced pipe

Corrosion-resistant reinforced plastic pipe — from 2- to 12-in. diameter, is being produced by Amercoat. The company uses a patented process employing interwoven fiber glass filaments, impregnated with epoxy resins and heat cured. Known as Bondstrand, the pipe comes in rigid 20-ft lengths with ends plain, bell-and-spigot or flanged. One standard series has a nominal working pressure of 250 psi; the other 500.
*Amercoat Corp.*

## TRADE LITERATURE

### 29. Tubing, pipe fittings

Information on the application of tubing, pipe, and welding fittings is contained in a new 48-page booklet from Babcock & Wilcox. Included are application data and points to consider in selection of materials.
*Babcock & Wilcox Co.*

### 30. Bronze valves

New illustrated literature is available from Walworth on its 150-lb WSP bronze globe, angle and check valves. Included are service ratings and dimensional drawings for each type valve.
*Walworth Co.*

### 31. Engine bulletin

Included in a new bulletin from Nordberg are the latest designs of diesel, duafuel and spark-ignition gas engines. Shown are the bore, stroke and hp range of each. In addition to the gas engines, the company's complete product line is covered in the 12-page, 3-color brochure.
*Nordberg Manufacturing Co.*

### 32. Time-impulse telemetering

A new 8-page bulletin tells how Chronoflo telemeters enable users to observe and record the operation of widely scattered meters at a central location from any distance. The bulletin contains photographic illustrations, schematic diagrams, performance charts, and explanatory text.
*Builders-Providence Inc.*

### 33. Gas lights

A 4-page, color folder has been published by Arkla Air Conditioning Corp. describing its new line of "Gaslites." Installation photos show the gas lights installed at entrance, in the yard, and in the patio.
*Arkla Air Conditioning Corp.*

### 34. Plastic pipe

Southwestern Plastic Pipe Co. has issued a 4-page, illustrated folder discussing the wide variety of uses of three types of semi-rigid and rigid plastic pipe.
*Southwestern Plastic Pipe*

### 35. Hydraulic governor

Farris Pickering has issued a bulletin describing its hydraulic governor, a compact, light weight, speed control device. The control works on gasoline or diesel generator sets, engine-driven compressors, engine-driven arc welders, etc.
*Farris Pickering Governor Co.*

### 36. Pipeline engines

A brief summary of White Diesel Engine's line of Superior diesel, gas, and dual-fuel engines has been issued. The 4-page, 2-color catalog lists 19 models of six basic engines to meet a variety of pipeline power requirement.
*White Diesel Engine Division*

### 37. "The meter that pumps"

A new 8-page, 2-color bulletin features the new integral McCannameter. The bulletin describes the features of this new proportioning pump that is available in either diaphragm or bellows construction with maximum capacities from 6 cc/min. to 6 gph.
*Hills-McCanna Co.*

### 38. One-man trencher

A 4-page catalog describes one-man operated trencher, the Arps Trench-Devil, Model Jr. The Trench Devil digs a trench 2¾ in. wide and up to 20 in. deep.
*Arps Corp.*

### 39. Gas kitchen package

Mayfair's "matchless gas kitchens" are illustrated and described in a new catalog. The multi-colored brochure features gas-burning appliances of a variety of manufacturers along with Mayfair kitchen cabinets.
*Mayfair Kitchens*

### 40. Wagon drills

Ingersoll-Rand's three models of wagon drills are the subject of a new bulletin. FM-4 wagon drill is for tough, sustained work; the FM-4 rotary is for fast jobs; and the lighter JHM Wagonjack is recommended for jobs where weight is a problem.
*Ingersoll-Rand*

### 41. Cooling tower

Complete specifications, tower dimensions and mechanical details on the Pritchard Lo-Line fire-code cooling towers are presented in a new bulletin. The new cooling towers — with capacities ranging upward from 75 tons—are designed specifically to conform to standard metropolitan fire codes.
*J. F. Pritchard & Co.*

# GAS CALENDAR

**May**

5- 9..AGA Distribution, Production, and Transmission Conference—Roosevelt and Commodore Hotels, New York.

5- 9..AGA Commercial Gas School, Industrial & Commercial Gas Section—Edgewater Beach Hotel, Chicago.

6- 7..PCGA Technical Section Transmission Conference—San Diego, Calif.

8- 9..Annual Convention Public Utilities Advertising Association—Penn Sheraton Hotel, Pittsburgh.

9..Southeastern Gas Association Gas Sales Conference—Selwyn Hotel, Charlotte, N. C.

Week of May 12..PCGA Sales Section Industrial Gas School—Los Angeles.

12-13..AGA Eastern Gas Sales Conference, Residential Section—Park Sheraton Hotel, New York.

15..NEGA Operating Division—Sheraton-Biltmore Hotel, Providence, R. I.

15-16..Midwest Industrial Gas Council—Joliet, Ill.

19-21..AGA-Mid-West Regional Gas Sales Conference—Edgewater Beach Hotel, Chicago.

19-23..National Fire Protection Association Annual Meeting—Palmer House, Chicago.

20-21..PCGA Technical Section Customer Service Conference—Olympic Hotel, Seattle, Wash.

20-22..Pennsylvania Gas Association Annual Meeting—Pocono Manor Inn, Pocono Manor, Pa.

22-23..Natural Gas & Petroleum Association of Canada Annual Meeting—Windsor, Ont.

22-24..Annual Management Conference of Florida-Georgia Gas Association—Key Biscayne Hotel, Key Biscayne, Miami, Fla.

23..Southeastern Gas Association Gas Distribution Conference—Selwyn Hotel, Charlotte, N. C.

**June**

4- 5..AGA-PCGA Joint Domestic Gas Research & Utilization Conference—Ambassador Hotel, Los Angeles.

4..NEGA Operating Division—Sheraton-Biltmore Hotel, Providence.

5- 6..NEGA Sales Managers and Supervisors Workshop—Toytown Tavern, Winchendon, Mass.

10-12..3rd Annual Appalachian Underground Corrosion Short Course—West Virginia University, Morgantown, W. Va.

11-13..Gas Measurement School—Worcester Polytechnic Institute, Worcester, Mass.

11-13..NEGA Operating Division—Sheraton Biltmore, Providence, R. I.

15-19..American Society of Mechanical Engineers—Hotel Statler, Detroit.

23-24..Michigan Gas Association—Grand Hotel, Mackinac Island Mich.

24-27..Canadian Gas Association Annual Meeting—Manoir Richelieu Hotel, Murray Bay, Quebec.

**August**

25-27..Appalachian Gas Measurement Short Course—University of West Virginia, Morgantown, W. Va.

**September**

3- 5..Pacific Coast Gas Association Annual Convention—Multnomah and Benson Hotels, Portland, Oregon.


# smell bad?

Leaking bell-and-spigot joints can create bad relations with *your* public. . . . Vegetation damage due to seeping natural gas can cost you plenty too!

To solve the problem of leaking joints due to dried-out joint packing, gas utilities have turned to CARBOSEAL Anti-Leak. By swelling the jute and hemp fibers as much as 44 per cent of their dry volume CARBOSEAL Anti-Leak can *eliminate* leakage . . . with an estimated effective life of up to 25 years!

CARBOSEAL Anti-Leak is easy and inexpensive to use. Find out how other gas utilities have profited from this treatment. Write today for the booklet "Stop Gas-Main Leakage with CARBOSEAL Anti-Leak" . . . and the 16 mm. color-sound motion picture "CARBOSEAL Anti-Leak Stops Gas-Main Leakage" . . . address Dept. B.

CARBOSEAL ANTI-LEAK

**UNION CARBIDE CHEMICALS COMPANY**

*Division of* UNION CARBIDE *Corporation*

30 East 42nd Street, New York 17, New York

In Canada: Carbide Chemicals Company, Division of Union Carbide Canada Limited, Montreal

*The terms "Carboseal" and "Union Carbide" are registered trade-marks of Union Carbide Corporation.*

## GAS·PEOPLE

**M. M. Fidlar**
Mountain Fuel

**Avery Mays**
Lone Star

Several promotions have been made by Mountain Fuel Supply Co., Salt Lake City. M. M. FIDLAR has become senior vice president and JOE W. ALLEN is now vice president in charge of distribution. The changes were made necessary by the retirement of J. D. Roberts, who is succeeded by Mr. Allen. With Mr. Fidlar's transfer to Salt Lake, direct supervision of the company's Rock Springs, Wyo. office comes under J. T. SIMON, vice president in charge of production and transmission. L. W. FOLSOM, senior geologist, has been named manager of the company's exploration division, and W. W. SKEETER, also senior geologist, is now chief geologist for Mountain Fuel. Both men headquarter in Rock Springs.

BILL DALTON has been elected executive vice president of Arkansas Western Gas Co., Fayetteville, Ark. With the company since 1931, he most recently has served as vice president in charge of sales.

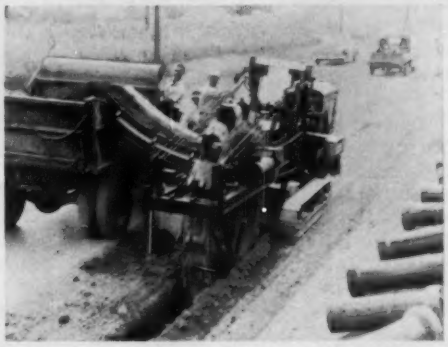
AVERY MAYS, general contractor and developer of real estate products, has been elected to the board of directors of Lone Star Gas Co., Dallas.

PAUL E. SMITH has been named assistant manager of Peoples Natural Gas Co.'s Glenshaw (Pa.) service area. Mr. Smith joined the company in 1952 and since then has held various posts in the distribution and engineering departments.

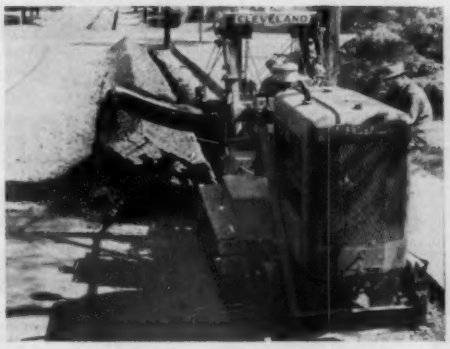
Promotion of three sales executives has been announced by the Norge Division of Borg-Warner Corp., Chicago. HAROLD P. BULL, formerly vice president in charge of distribution, is now vice president of sales. WALTER C. FISHER, who has been field and general sales manager and manager of key ac-


# CLEVELAND TRENCHERS

## DIG CLEAN
• to exact width and depth specifications
• to perfect grade
• straight and fast



## SAVE MORE
• on backfill material
• on hand finishing
• on right-of-way damage



## MAKE MORE
• by higher production in all soil conditions
• with lower cost for all trench work

# CLEVELAND 80W

**LAYS PIPE**
• large capacity side boom
• long reach

**FILLS TRENCH**
• fast, clean
• from either side

**TAMPS FILL**
• to compaction specs
• simultaneous with backfill

*Before you bid your next job contact your local Cleveland distributor*

**The CLEVELAND TRENCHER Co.**
20100 ST. CLAIR AVE. • CLEVELAND 17, OHIO

Good Everywhere

counts, is now director of distribution. JAMES D. DOUGHERTY, formerly national refrigeration sales manager, becomes national field sales manager.

JOSEPH H. LANG and HERBERT A. TITSCH were elected assistant vice presidents of the Ohio Fuel Gas Co. recently. Mr. Lang, assistant manager of the transmission division of Ohio Fuel, becomes executive assistant to Clyde C. Phillips, vice president in charge of transmission. Mr. Titsch becomes executive assistant to W. E. Ferguson, vice president in charge of production and storage. OFG also named RALPH P. WAGSTAFF to succeed Mr. Titsch as superintendent of the civil engineering and map department.

**Joseph Lang**
Ohio Fuel

**Herbert Titsch**
Ohio Fuel

**E. R. Torgler**
Dresser

**J. R. Harrahill**
Dresser

Several promotions were announced by Dresser Manufacturing Division, one of the Dresser Industries. E. R. TORGLER, works manager, was named director of manufacturing for the Bradford, Pa. company. At the same time, J. R. HARRAHILL, assistant to the general manager for manufacturing and engineering, was named acting works manager. Dresser also appointed CHARLES KUHN sales manager, regular products, and promoted STEPHEN B. HODGES, former manager of marketing, to director of marketing planning and control. Other Dresser appointments include WILLIAM H. ROWELL and JOHN P. LORD to the posts of product managers for bolted couplings and welding fittings, respectively.

GEORGE A. GILLIN has retired as secretary of Pacific Lighting Corp., San Francisco, after 30 years with the company. Promotions at Pacific Lighting include: PAUL A. MILLER to vice president and treasurer, FRED J. PARKER to secretary, and WILLIAM R. BIGELOW to assistant secretary and assistant treasurer. In addition to his duties as vice president, W. M. JACOBS has assumed the post of senior vice president of Pacific Lighting Gas Supply Co., Pacific Lighting subsidiary, where he is now in charge of gas procurement.

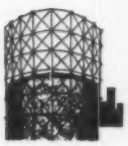
EDWIN H. KRIEG, vice president and consulting engineer of Stone & Webster Engineering Corp., New York, has been elected a director.

General Attorney H. P. LETTON, JR. has been elected to the board of directors of Southern California Gas Co. At the same time, H. A. PROCTOR, presently manager of engineering, was elected vice president in charge of engineering and transmission. Mr. Proctor's promo-

*More than*

**2 MILLION FEET OF ½ INCH KRALOY SERVICE PIPE**

*already installed*



Since 1945 more than two million feet of one-half inch Kraloy Plastic Pipe has been installed for natural gas service lines. This one-half inch PVC pipe has done a job superior to that of ¾ inch, and larger pipe, when made of other materials.

One-half inch Kraloy PVC Pipe can also supply more than an adequate volume of natural gas to your customers. Kraloy can do this because of its mirror-smooth interior walls which result in an extremely high C factor.

**Other Kraloy advantages:**

1. Kraloy is permanent—not subject to electrolysis, rot, rust or scale.
2. Kraloy's flexible strength allows it to be installed faster and easier.
3. Kraloy's lighter weight lets your trucks carry more pipe footage.
4. Kraloy delivers cleaner gas—reducing foreign deposits in jets, valves, etc.

**WHEN YOU SPECIFY YOUR NEXT INSTALLATION, DO AS OTHER LEADING GAS COMPANIES DO...SPECIFY KRALOY PVC PLASTIC PIPE!**

*Representatives:*
The Mask Company—Houston, Texas
H. J. Hodes—Kansas City, Mo.
The Crane Co.—Los Angeles & Denver
Southeastern Distributing Co.—Miami

Call, write or wire for detailed information and specifications.

**KRALOY** *plastic pipe co., inc.*
4720 East Washington Boulevard, Los Angeles, California
Subsidiary of the Seamless Rubber Co., a Rexall Drug Co. Subsidiary

**Charles Kuhn**
Dresser

**Stephen Hodges**
Dresser

tion, and the subsequent executive and managerial assignment changes, resulted from the move of Vice President GROVE LAWRENCE to the Pacific Lighting Gas Supply Co. Mr. Proctor's present post of manager of engineering will be filled by S. A. BRADFIELD, manager of transmission. T. S. MILLER, supervisor of system planning, moves to Mr. Bradfield's post, while A. M. LAWSON, San Joaquin valley division engineer, takes over Mr. Miller's former assignment.

JOHN LAWRENCE, executive vice president of Dresser Industries Inc., Dallas, has been elected to the company's board of directors.

ERWIN E. HIRSCHBERG has been named sales manager, industrial combustion division, Eclipse Fuel Engineering Co., Rockford, Ill. He joined Eclipse in 1953 as a combustion sales engineer. Later he became eastern territorial manager.

JOE H. VICRY has been appointed to succeed ROGER W. GREEN as district manager of MidSouth Gas Co. at Newport, Ark. Mr. Vicry was assistant district manager at West Memphis for several years.

T. E. FLOWERS, JR. has joined the staff of the space planning department of Ebasco Services Inc., New York.

Whirlpool Corp., St. Joseph, Mich., has realigned its sales force for RCA Whirlpool appliances. The newly established general sales division is under the direction of JOHN CROUSE, general sales manager. L. W. HOWARD is general manager of advertising and sales promotion. HARPER DOWELL, formerly a director of distribution, is now distribution manager. GEORGE STEVENS, formerly general manager of the range and refrigeration division, is now merchandise manager. And, SOL GOLDIN, formerly merchandise manager for ranges, is key accounts manager.


**There are more DAVEY "Auto-Airs" in service today than the combined total of all competitive makes!**

*Here are a few of the many reasons for this overwhelming preference*

The Davey Hydrovane Rotary "Auto-Air", driven direct from the truck engine through a Davey heavy-duty power take-off, is the world's most portable compressor. It moves from job-to-job as fast as the truck will travel.

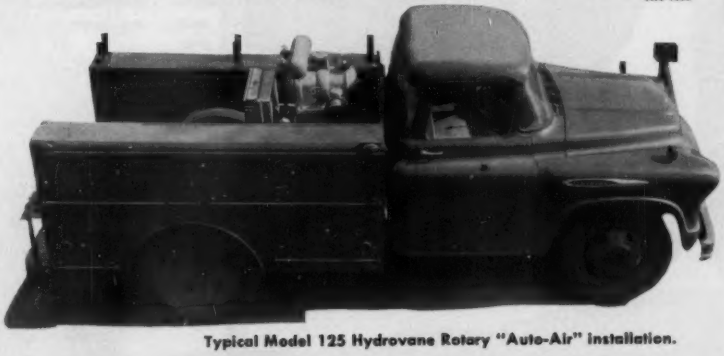
Price of complete compressor-truck unit compares favorably with trailers of same capacity.

"Auto-Air" occupies only one-third of truck body space. Rest is available for transportation of men, tools, materials.

Davey is the only manufacturer that builds the complete "Auto-Air" . . . covers compressor and take-off with one guarantee.

Standard "Auto-Airs" are available in 125 and 160 c.f.m. capacities . . . other sizes on special order. They can be mounted on most standard trucks with any type of body. Write for Bulletin E-230.

AA-7295



Typical Model 125 Hydrovane Rotary "Auto-Air" installation.

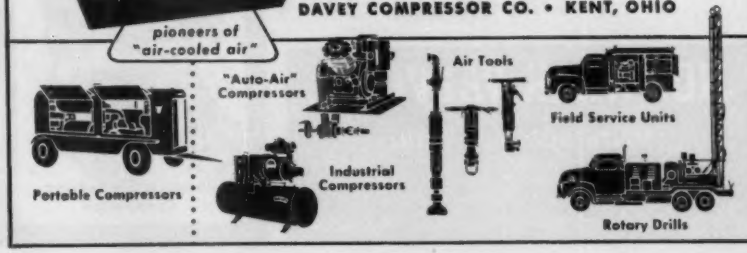
Note extreme compactness of Hydrovane Rotary Compressor.

Davey Hydrovane Rotary units have 50% fewer working parts than ordinary compressors . . . are easy and economical to operate, maintain, service.

DAVEY

pioneers of "air-cooled air"

DAVEY COMPRESSOR CO. • KENT, OHIO



## people • *Continued*

**Thomas J. Watt**
Sprague Meter

**T. A. St. Clair**
Sprague Meter

**Frank Bright**
Standard

**F. A. Sincock**
American Standard

Two major appointments have been made by Sprague Meter Co., Bridgeport, Conn. THEODORE A. ST. CLAIR has joined the company as chief engineer. Formerly, Mr. St. Clair was assistant chief engineer at Bastian-Blessing Co., Chicago. He is the holder of more than 60 issued U. S. Patents and many foreign patents. Newly appointed eastern regional manager of Sprague is THOMAS J. WATT, who will headquarter in the Bridgeport office. Mr. Watt has been with Sprague for more than 29 years, serving in various capacities in the organization.

FRANK BRIGHT has been appointed sales manager of Standard Magnesium Corp., Tulsa. Mr. Bright joined the company recently after spending nine years with Manning, Maxwell & Moore as district sales manager in Tulsa.

FREDERICK A. SINCOCK is manager for domestic water heaters made by the Plumbing & Heating Division of American-Standard. Mr. Sincock has been with the company since 1952, most recently as supervisor of water heater products.

F. W. CARTER has been named chairman of the Peerless Manufacturing Division of Dover Corp. THOMAS D. BROMLEY succeeds him as president. ROBERT B. STONE was made vice president—sales. He was formerly Chicago district sales manager. Mr. Bromley and Mr. Stone retain their posts as president and vice president, respectively, of Dura-Vent Corp., Redwood City, Calif., a Dover subsidiary.

FRANK H. ADAMS has been elected chairman of the board of Webster Engineering Co., Tulsa. Succeeding him as president is LEON S. REGAN, who has been vice president and general manager. GEORGE C. BERGTHOLDT, formerly vice president, succeeds Mr. Regan.

The ElectroData Division of Burroughs Corp., Pasadena, Calif., has named J. P. LEEBRICK and E. R. LUND Los Angeles and San Francisco district managers, respectively.

WILLIAM M. DAY and GORDON N. GRAY have been promoted to vice presidents of Bryant Manufacturing Co., Indianapolis. Mr. Day is in charge of engineering and Mr. Gray assumes executive administration of all engineering.

HARMON B. MCLENDON has been appointed an account executive for

NORWALK ENGINEERED CHECK VALVES

Series 1300 Steel Fabricated

Tested and Approved by Factory Mutual Labs.

**Positive Check OF BACK PRESSURES**

in pipe sizes from ½" to 42" and larger

**NORWALK** custom engineered Check Valves provide absolute protection against reverse flow of gas and air and operate at full capacity with negligible pressure drop. Rugged construction and time-tested features assure dependable performance with practically no maintenance. Custom built for special and standard horizontal or vertical installations in any size pipe.

Norwalk valves and engineering assistance provide a complete service that meets every gas and air control problem.

For positive control of gas and air —

*Call Norwalk.*

INDUSTRY'S COMPLETE LINE

*Check Valves* Pipe Sizes ⅜" to 42". Screwed end Models to 4".

*Manometers* Pressure or Vacuum.

*Pressure Controllers* Pressures to 5 psi.

*Appliance Regulators* Pipe Sizes ½" to 2".

*Station Regulators* Pipe Sizes 3" to 24". Liquid Seal or Diaphragm Types.

*Relief Valves* Pipe Sizes ½" to 24".

*Filters* Pipe Sizes ½" and up.

Complete Engineering Cooperation

**NORWALK VALVE CO.**
Established 1878
SOUTH NORWALK, CONN.
Boston • Chicago • Cleveland • Detroit • Los Angeles
Minneapolis • New York • Philadelphia • Pittsburgh
San Francisco • Washington, D.C.
In Canada: Ontar Ltd., Toronto; Bescom Corp., Ltd., Montreal

**Harmon McLendon**
General Controls

**Robert Burnside**
Ludlow

industrial control sales in the southern California area, according to an announcement from General Controls Co., Glendale, Calif. Mr. McLendon comes to General Controls from the Mettler Co., where he served as sales manager for industrial and commercial gas and oil burners.

ROBERT G. BURNSIDE has succeeded ERIC A. RUTLEDGE as sales manager of the Ludlow Valve Manufacturing Co., Troy, N. Y. Mr. Rutledge has retired. Mr. Burnside has been with Troy Belting Co., Cling Surface Co., and the Hancock Valve Division of Manning, Maxwell & Moore, Inc.

LAWRENCE H. RIDDILE is superintendent, field, of Oakford district and W. PARK STEELE is superintendent, stations, in the same district, according to New York State Natural Gas Corp., Pittsburgh. Mr. Riddile will headquarter at the Jeanette office while Mr. Steele will be located at the Oakford district station. The company also announced the promotion of NELSON A. INGERSOLL to superintendent of the Harrison district, succeeding JOHN E. STUCHELL, who has moved to another assignment in Pittsburgh.

HAROLD B. CORNWELL has been promoted to assistant district manager of Ohio Fuel Gas Co. He has been Athens (Ohio) district special representative since May 1956.

PETER C. DIRKSEN has been named vice president and general manager of the New Bedford (Mass.) Gas & Edison Light Co. He succeeds the late Ralph M. Miller. Mr. Dirksen also has become a member of the board of directors of the NEGEA Service Corp.

The board of directors of Long Island Lighting Co., Mineola, N. Y., elected EDWARD C. DUFFY and HOWARD B. WAKEMAN senior vice


ARCCO

*The World Over*
—wherever there is gas

**ARCCO-ANUBIS Dry-Air GAS GRAVITOMETERS**

This new Arcco-Anubis Dry Air Gas Gravitometer determines and records specific gravity of gases automatically corrected to the humidity content of the air. The difference in weight between a column of GAS and equal column of DRY AIR is measured. This ratio represents the true specific gravity of the sample.

One bell of the instrument is filled with gas which is being measured, and the other bell is filled with dry air. Otherwise, except for the new instrument having one column for gas and one column for dry air, the unit is identical in operation to the standard gas gravitometer. When calibrated and properly installed, these instruments require little attention other than to wind the clock, ink the pen, and change the chart. Send for bulletin No. 101.

**AMERICAN RECORDING CHART CO.**
3113 E. 11th St. • Los Angeles 23, Calif.

**Available for Early Delivery**

**SEND FOR BULLETIN No. 101-R3**



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**PIPE STOPPERS OF ALL KINDS**

**SAFETY GAS MAIN STOPPER CO. INC.**

GOODMAN
USED SINCE 1897
2" HANDLE & LOCKING SLEEVE
GAS MAIN STOPPER

**523 Atlantic Avenue**
**Brooklyn 17, N. Y.**
Cable Address GASTOPPER, N. Y.

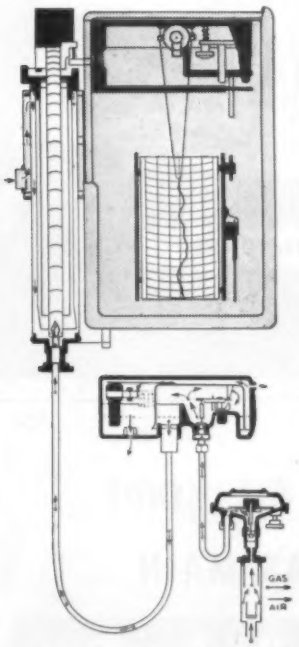
Municipalities:
Control Your Gas Cost With Propane-Air

Install a Propane-Air Peak Shaving Plant Similar to the One Shown Above and Control Your Gas Cost.

**LP-GAS PEAK SHAVING & STANDBY PLANTS for MUNICIPALITIES & INDUSTRY**

Design EGE Construction

**EMPIRE GAS ENGINEERING COMPANY**
**ENGINEERS & CONTRACTORS**
**7 Baltimore Place NW • TR 2-6611 • Atlanta 8, Ga.**



# Sigma
## Wobbe Index Recorder
### THE WORLD'S FIRST

Now, Sigma's Wobbe Index Recorder gives you a continuous record of *actual* thermal delivery.

$$\text{Wobbe Index} = \frac{\text{Calorific Value}}{\sqrt{\text{Specific Gravity}}}$$

This instrument is reliable and relatively inexpensive. Recordings are highly accurate. An optional unit will also control Wobbe Index if desired.

**The Flow Regulator** regulates gas flow to the burner. It senses slight changes in specific gravity and compensates for changes in barometric pressure and room temperature.

**The Recording Mechanism** is actuated by the heat of the combustion of the gas. Responds rapidly to changes in Wobbe Index. Not affected by normal temperature and pressure changes. Highly sensitive, frictionless magnifying system. All parts well protected against corrosion.

**Write For Further Information**

**COSA** — *National Representatives for Sigma Instrument Co., England*
**COSA CORPORATION, 405 LEXINGTON AVENUE, NEW YORK 17, N. Y.**

## people • *Continued*

presidents. Mr. Duffy's most recent post has been that of vice president and his responsibilities include engineering, construction, and gas and electric operations. Mr. Wakeman's most recent post was that of vice president in charge of community relations and commercial affairs. Elected as vice presidents of the company were former assistant vice presidents, SAMUEL W. HORSFIELD, CHARLES Y. OSBURN, and WILLIAM WELCH, JR. Mr. Horsfield is in charge of gas operations. Mr. Osburn heads employee relations, and Mr. Welch is in charge of engineering. JAMES F. DALY, formerly assistant controller, was elected to the newly created office of associate controller.

MALCOLM C. MACAULEY has been named assistant manager of the North Shore Gas Co., Beverly, Mass. He entered the gas business of New England Electric in 1935 as a distribution clerk with the old Gloucester Gas Light Co. In 1946 he was made assistant superintendent and became manager in 1952. In 1953 he joined the Norwood Gas Co. as assistant manager. In 1954 he became manager and two years later was named a vice president and director at Norwood. Succeeding Mr. Macauley in the Norwood post is JOHN H. TYLER. He has been with the New England Electric System since 1930.

E. N. AVEGNO has been appointed executive assistant of New Orleans (La.) Public Service Inc. He is succeeded as general sales manager by CHARLES J. SINNOTT.

H. EDWARD WOLFE has been elected president of the Erie (Pa.) Natural Gas Co. Inc.

DANIEL S. MCINTIRE has retired as Springfield district manager for Ohio Fuel Gas Co. He has been with Ohio Fuel 24 years, the last 11 as manager at Springfield.

Ottawa (Kan.) Steel Division of Young Spring & Wire Corp. has revised its sales territories and appointed four new regional managers. GERALD F. FITZGERALD heads sales in the New England states and eastern Canada. ROBERT H. LOOSE has transferred from the New England territory to the Middle Atlantic states, and NORMAN L. MCARTHUR has transferred from the Middle Atlantic area to the central states territory with head-

quarters in Tulsa. CHARLES W. SANDERS is the new regional manager in the north central states, Manitoba and western Canada. He headquarters in Minneapolis. PAUL L. RATLIFF is moving from this territory to the southern area, consisting of Kentucky, Tennessee, Mississippi, Alabama, eastern Louisiana, and the western arm of Florida. WILLIAM D. LYON is regional manager in Texas and western Louisiana, with headquarters in Dallas. JOHN D. HENLEY, former manager of the south central area, has been transferred to Illinois, upper Michigan, and the eastern portions of Wisconsin, Iowa, and Missouri. A. R. PHILLIPS is regional manager for the states of Colorado, New Mexico, Utah and southern Wyoming.

FLOYD P. FOSTER has been named chief engineer, compressor stations, central division, of New York State Natural Gas Corp., Pittsburgh. He will headquarter at the Luthersburg, Pa. station. Newly named head engineer, Sabinsville compressor station, is ROBERT R. CODER. New York State also has named CHARLES E. BROOKS as assistant to manager (storage) and JOHN W. HART as assistant to manager (stations).

RUSSELL H. WILLIAMS has been elected vice president in charge of public relations for Public Service Electric & Gas Co., Newark, N. J. He succeeds ROBERT A. ZACHARY, who has retired after more than 28 years in public relations work with the company. He has been vice president in charge of PR since 1939. Mr. Williams has been executive assistant since 1942.

Barrett Division, Allied Chemical & Dye Corp., has promoted D. A. MITCHELL and W. D. LABAUGH to district managers of industrial tar products sales. Mr. Mitchell will cover the western part of the country from his Chicago headquarters. Mr. Labaugh will handle sales in the East from his New York offices.

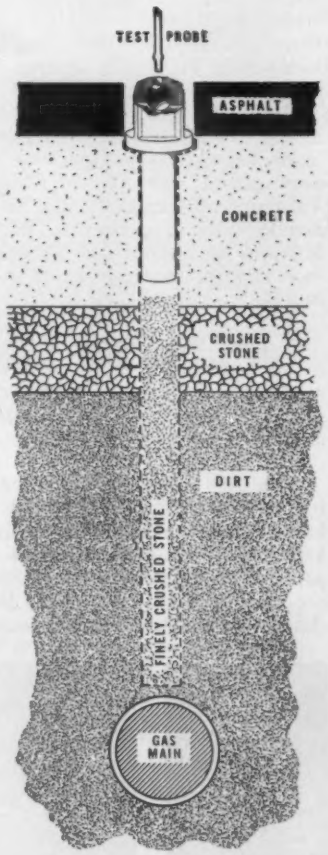
S. E. SWEET has been named general manager of the refrigeration division of the Whirlpool Corp., St. Joseph, Mich. Mr. Sweet comes to Whirlpool from the Gibson Refrigerator Co.

JOHN L. MCCAFFREY, chairman of the board and chief executive officer of International Harvester Co., is retiring from active manage-


## NEW — HEATH A-T-I (Auto-Test-Insert) Unit provides permanent test hole facility which permits thorough and accurate surveys for leakage control . . .

Designed to facilitate both thorough and rapid location of gas leaks in paved areas, the Auto Test Insert has a self-sealing neoprene insert. Testing for leaks is done instantaneously from a vehicle, without use of tools or removing a cap. A probe is inserted into the A-T-I Unit by a man seated in the vehicle. The Unit is made of cast iron, while top insert plug is a special bronze alloy. Once installed, it requires no maintenance or other attention.

Photo of Heath Auto Test Insert (Pat. Pending) showing exterior ribs at top, to keep installation in place without movement.




Installation drawing showing Heath A-T-I Unit in pavement. Height of test hole can be adjusted to compensate for repaving, etc.

The A-T-I test hole unit is installed in selected locations along gas lines where frequent drilling of test holes is both costly and hazardous. A probe is inserted through a hole in the bronze top of the unit, forcing open a neoprene diaphragm. A sample of sub-soil atmosphere is taken and the probe withdrawn. Diaphragm springs back to its original position, re-sealing test hole.

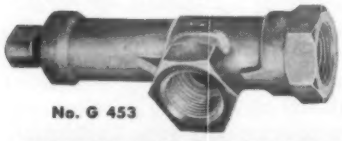
Bulletin H-2 completely describes the Heath A-T-I Unit, and includes a typical Block Plan showing how units are positioned in downtown areas. It is estimated that use of A-T-I Units will permit the making of Heath Leakage Control Surveys in 50% of the time required with previous methods.

For information about Heath Leakage Control Surveys, write to:

**HEATH SURVEY CONSULTANTS, INC.**
**573 Washington Street**
**Wellesley 81, Massachusetts**

# WELSBACH
## "SAFE-GARD" GAS STOP
### TAMPER-PROOF EASY RE-LUBRICATION DURABLE

Lock Wing "Safe-Gard" Gas Stop... Cast Iron Body, Bronze Plug with Lubricant Channels. Flat Head Type, Catalog No. G 551... 125 p.s.i. max. pressure... Sizes ¾" to 2". Tamper-proof design is so simple, yet so positive and far superior to anything else on the market. The key cannot be removed or blown out, even if broken in two at the gasway by unauthorized personnel. Grease plug is at top of valve for utmost relubrication convenience. "Safe-Gard" feature: the holding screw is permanently concealed from view, in fact, only microscopic examination reveals evidence of this camouflaged recess in the casting... see for yourself by asking for your copy of the WELSBACH-Kitson Catalog.


No. G 453

## HIGH PRESSURE GAS VALVE
### EASE OF OPERATION, NO EXPOSED NUTS OR BOLTS, BRONZE TO BRONZE, NO LUBRICATION REQUIRED

Tamper-proof High Pressure Gas Valve, metal to metal seating, max. pressure 200 p.s.i. 1" Inlet and Outlet, inside iron pipe thread. These valves have no exposed bolts or nuts. When the valve is in full open position, the upper bronze to bronze back seat eliminates all surface line pressure on the packing. Superior design and individual inspection insures against gas leakage or binding... there are truly no better, if as good, valves than those by WELSBACH-Kitson! Write for the detailed Catalog.

The name WELSBACH has stood for Quality and Dependability for more than 80 years.

WELSBACH

THE WELSBACH CORPORATION
WESTMORELAND & STOKLEY
PHILADELPHIA 29, PENNA.
Kitson Valve Division


## people • *Continued*

**Hugh Libby**
B.C. Electric

**D. W. Minion**
B.C. Electric

ment of the company after 49 years of service. He will continue to serve as a member of the board of directors and of the executive committee of the board. FRANK W. JENKS, president, succeeds Mr. McCaffrey as chief executive officer of the company in his capacity as president. The office of chairman will not be filled.

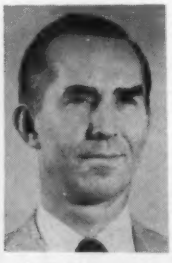
JOSEPH A. HOWELL JR. has been named counsel for the executive offices of Robertshaw-Fulton Controls Co. He will function as resident attorney at the company's Richmond, Va. headquarters.

HUGH T. LIBBY has been promoted to the newly created post of manager of gas engineering and development for B. C. Electric, Vancouver. Succeeding him as gas distribution manager of D. W. MINION, who coordinated the conversion to natural gas which began in 1956.

CLIFTON WADE has been elected to the board of directors of Arkansas Western Gas Co., Fayetteville, Ark. He has served the company as general counsel for 20 years.

As a step in the rapidly expanding sales organization of Hammarlund Manufacturing Co., New York, L. C. MENKES has been appointed sales manager of engineered products. He will have charge of centralized operations

**L. C. Menkes**
Hammarlund


**A. I. Thompson**
Barton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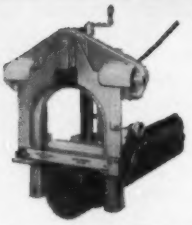
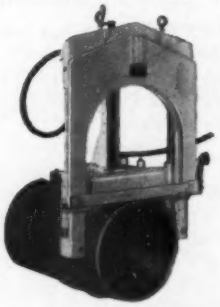
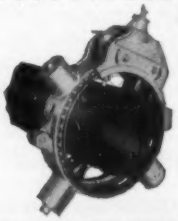
PORTABLE POWER AND MANUAL PIPE CUTTERS
2" TO 72" CAPACITY


**WACHS GUILLOTINE SAW**
2" to 8" Capacity
Electric or Air Drive


**"BIG" GUILLOTINE SAW**
10" to 16" Capacity

**WACHS NATIONAL SAW**
"The milling machine on wheels"
Cuts 10" to 72" Pipe


**WACHS STRICKLER RATCHET CUTTER**
"Lathe Type Cuts"
5 sizes—2½" to 24" Capacity
Write for descriptive bulletins

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*Manufacturers of Engines, Valves and Machinery since 1883*
9525 NORTH DAYTON STREET
CHICAGO 22, ILLINOIS

control equipment, which includes tone signaling equipment, pulse width selection equipment, alarm systems, and pulse counting equipment. Mr. Menkes has been with Hammarlund since 1953 as a sales engineer.

A. I. THOMPSON has been promoted to vice president in charge of sales for Barton Instrument Corp., Monterey Park, Calif. Before his recent appointment, Mr. Thompson was vice president and sales manager.

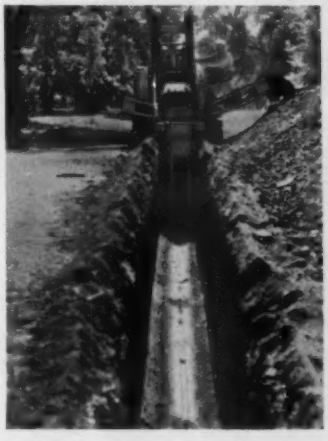
### Deaths

ARTHUR F. BRIDGE, president of Southern Counties Gas Co., Los Angeles, from 1947 to 1954, died late in March in a hospital near San Francisco. An active industry man, Mr. Bridge was president of the American Gas Association in 1942 and of the Pacific Coast Gas Association in 1949. He was assistant engineer in the gas and electric division of the California Railroad Commission from 1913 to 1917. Following World War I, Mr. Bridge joined SoCounties as rate engineer and was promoted to executive engineer in 1926. In 1928 he was elected vice president in charge of operations. He became vice president and general manager in 1939.

NEWELL E. LOOMIS, consultant to the president of Michigan Consolidated Gas Co., died recently in Ann Arbor, Mich. He had served the Detroit company as vice president and sales manager from 1949 until 1953. Mr. Loomis would have completed 50 years with Michigan Consolidated in August. He rose through the sales offices to become assistant sales manager, merchandise sales manager and, in 1946, Detroit district sales manager. In 1949 he was elected a vice president and in 1953 was appointed consultant to the president.

CHARLES H. THORPE, 71, former general manager of the Arkansas division of Arkansas Louisiana Gas Co., died in Bauxite, Ark. recently. Mr. Thorpe was a member of the ArkLa organization for 46 years until his retirement in 1956.

MARION WASSON, 68, vice president and director of the Arkansas Western Gas Co., Fayetteville, died recently.



*For any size trench from 6 inches to 6 feet wide — depths to 19 feet, there is a Parsons Trenchliner to fit your exact requirements. With 10 different models to choose from, Parsons line offers: ladder-type Trenchliners digging 6 to 72 inches wide at depths to 19 feet — and wheel-type Trenchliners digging 12 to 52 inches wide, at depths to 8½ feet. Shown above is a Parsons 130 Trenchliner. It's a handy wheel-type ditcher in the popular low-price range — small in size, big in capacity — digs up to 18 lineal feet of trench per minute, 12 to 24 inches wide at depths to 5¾ feet.*

## Low, compact, narrow— fits city clearances

Developed especially for city work, Parsons 155 Trenchliner gets around easily in congested areas. Low height of 7 feet-4 inches, and width of only 5 feet-4 inches over crawlers, permit digging under low-hanging trees, in narrow alleys, between houses, and in other tight quarters, normally inaccessible to trenchers of comparable size.

### Digs 10 feet deep

Small in size but big in capacity, the 155 economically handles everything from mainline extensions to pipe reclamation and residential service connections. It opens trench 16 to 26 inches wide, at depths to 10 feet. Digging speeds range from 5.8 inches up to 25 lineal feet per minute. This lets the 155 "inch" its way past cross-pipes and other underground obstructions typical of city trenching, or "open up" for maximum feet per minute on clear right-of-way. Positive down-crowd boom starts cut fast, holds accurate grade, undercuts cross-pipes, sidewalks, gutters — makes vertical set-ins. Want more facts? Contact your local Parsons distributor, or write now for 155 Trenchliner catalog.

**Mail to: PARSONS Company, Newton, Iowa** *for literature on 155 Trenchliner*

NAME..... TITLE.....

COMPANY..... DIV.....

STREET.....

CITY..... STATE.....

☐ *Also send information on 130 Trenchliner* P810 GAS

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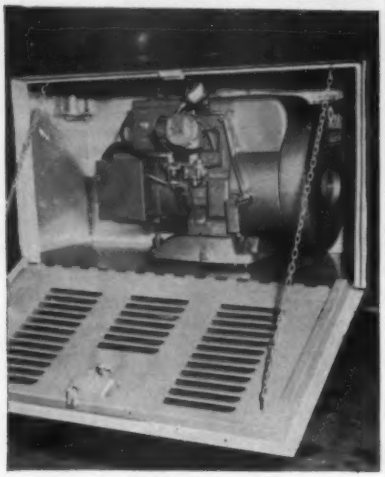
A DIVISION OF KOEHRING COMPANY

ELECTRIC PLANT
NEWS



**Charges truck batteries at far less cost... provides A.C. power, too!**

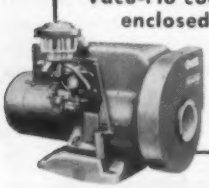
Before the dual-purpose Onan Electric Plant was installed on this maintenance truck, it was necessary to run the 160 H.P. truck engine to charge batteries used for communication. Now, the 2 H.P. Onan Electric Plant does the same job...saving fuel and engine maintenance.

The electric plant is an Onan Model 07AK-1R/972. It has an output of 750 watts A.C. or it can deliver 8 amperes for 12-volt battery charging. Plug-in receptacles are provided for operating electric drills, saws and other equipment used in construction and maintenance work.

***Big savings reported!***

One utility makes fuel savings alone estimated at $2.00 per day per truck. Another cites an annual saving of $800.00 per truck. This is based on battery charging output only. In addition, the A.C. output makes possible replacing hand tools with electric tools . . . saving time and money.

**Vacu-Flo cooling permits enclosed installations**



Vacu-Flo cooling is a low-cost optional feature on Onan air-cooled plants up to 10,000 watts.

**Other Onan Models:** 500 to 75,000 watts A.C., D.C. and Battery Charging

*Write for folder showing 3 Packaged Power Systems*

Onan
ELECTRIC PLANTS

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# GAS · ASSOCIATIONS

## SGA celebrating 50th anniversary

While paying tribute to the pioneers who met 50 years ago in Atlanta and organized the association that now covers 14 Southern states, the Southern Gas Association's annual meeting will emphasize "the forward look."

More than 2300 people are expected at the April 28-30 convention in Dallas. Convention headquarters are the Statler Hilton and Baker Hotels.

General sessions will present nationally known speakers, such as Dr. Norman Vincent Peale, pastor of Marble Collegiate Church in New York City; Dr. Willis M. Tate, president of Southern Methodist University; Bradford B. Smith, economist for United States Steel; and Robert W. Otto, president of the American Gas Association.

The sales section will present top executives of four of the largest manufacturers of gas appliances and equipment; one of the nation's leading sales teachers; the developer of the package all-gas kitchen; a director of motivation surveys, and leading executives of the AGA.

A "Panel of Presidents" will star H. A. Eddins, head man at Oklahoma Natural Gas Co.; W. A. Elmer, president of Texas Gas Transmission; and Hansell Hillyer, Sr., president of South Atlantic Gas.

Major General Otis O. Benson Jr., commandant of the Air Force School of Aviation Medicine at Randolph Field, will relate some of the problems common to space men and gasmen at the accident prevention session. SGA's president, Curtis M. Smith, will describe "Safety — Your Golden Opportunity," and Justin Wilson, a Baton Rouge (La.) safety consultant, will talk on "Safety for Your Industry and You."

Accounting section members will hear Frank M. Knox, a pioneer in control and simplification of office procedures, present a "Modern Yardstick for Measuring Clerical Costs"; William Ismay, Arizona Public Service, describe "The Mantle of Leadership"; James K. Polk, New York attorney, discuss "The Problems of Unifying Public Utility Accounting"; and J. H. Purdy, Baltimore Gas & Electric, discuss "PR—Not a Decal, But a Brand."

The human relations meeting will attract accounting, distribution, employee relations and transmission personnel to a brainstorming session with Joe Hopkins of the Ethyl Corp. Preceding this experiment will be James G. Howell, director of negotiations for the Mountain States Employers Council, who will speak on current labor trends.

W. D. Spears, Chattanooga attorney, will address the distribu-


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tion section on "Legal Problems of the Gas Industry." "Economics and Safety in Gas Distribution" is the topic to be discussed by Frank H. Mueller, director of research and development for the Mueller Co.

Transmission men will hear Allan Shivers, former governor of Texas and now chairman of the board of Western Pipeline Inc., speak on "Justice at the Wellhead." Tom P. Walker, chairman of Transcontinental Gas Pipe Line Corp., will give some "Thoughts on Retirement," and Major General William A. Carter, president of the Mississippi River Commission at Vicksburg, will discuss "Water Resources Development and the Gas Industry."

## Operating section joint meeting opens May 5

Gasmen — distribution, production, and transmission—are flocking to New York for the joint meetings of the AGA's operating section that will crowd the Roosevelt and Commodore Hotels on May 5-9.

The only general session scheduled for the five-day conference will be held Monday morning at the Roosevelt. Presiding and presenting opening remarks is R. C. Holcomb, chairman of the distribution committee.

Appearing on the program will be H. C. Jones, vice chairman of the operating section, who will report on the section's activities; D. E. Karn, president of Consumers Power Co., discussing what management expects from standardization; and W. W. Williams, Detroit Edison Co., whose subject is "Management Looks at the Transportation Department."

One of the main attractions of the conference will be the Blue Flame Luncheon, scheduled for Wednesday at the Roosevelt. V. F. Bittner, chairman of the operating section, will preside. Guest speaker is AGA Managing Director C. S. Stackpole. Committee service awards will be presented during the luncheon.

Six sessions are planned by the automotive and mobile equipment group. Groups holding two sessions include distribution, production and chemical, distribution design and development, construction and maintenance, transmission, corrosion, customer service, metering, compressor stations, and pipelines.

In addition, there will be meet-


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Designed for GAS Incinerators

BASOTROL semi-automatic VALVE

Combines 4 units in 1 compact unit

- *Semi-automatic main burner valve* with either 2-hour or 4-hour main burner operation cycle.
- *Baso automatic pilot* for complete shut-off of main burner and pilot burner gas.
- *Rotor pilot valve* with built-in adjustment for "on-off" pilot burner operation.
- *Pilot gas filter* for less pilot outage.

It's easy to install! It's compact and lightweight!

It's the all-new A.G.A. approved Basotrol semi-automatic incinerator valve, designed to give main burner operation in 2-hour or 4-hour periods or for any shorter time. All operating units are replaceable for quick and easy servicing. The main valve timer can be installed in any of four positions at the buyer's option.

Put a Basotrol valve in your new gas incinerator design. Pipe size: ⅜" N.P.T. Capacity: Natural Gas at 1" W.C., 82,880 Btu/hr.

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Service-Line Trench for Less . . . Minimum Turf Damage!

CHARLES' SELF-PROPELLED MODEL M-2 DITCH WITCH TRENCHER

PRODUCES TRENCH AT LOWEST COST Guaranteed...

. . . less than any other machine or method!

Model M-2 Illustrated

Now—dig narrow trench—3", 4½" or 6", straight as an arrow, with spoils neatly deposited on one side, and with minimum damage to the turf. We guarantee Ditch Witch to produce trench at the lowest possible cost, usually about 2c a foot. Check the M-2 features: Self-Propelled • 3 mph Mobility • Digs 6 fpm, up to 4' Deep • 9.2 hp • 3-Speed Transmission • One-Man Operation!

TRY a Ditch Witch and You'll BUY a Ditch Witch! Ask about Trial Purchase.

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Send me, without obligation on my part, additional information on the following:

☐ M-2 Ditch Witch ☐ Other Ditch Witch Trenchers
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Let SCF consultants "Ride Herd" on your gas leaks—account for "unaccounted-for" and eliminate safety hazards.

We can supply "Extra hands" and equipment to repair leaks if you need the help.

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ings on chemical and engineering, production, manufactured gas production, communications, gas measurement, gas from fluid fuels, odorization, underground storage, gas dispatching, and gas from solid fuels.

## Well-balanced program highlights NEGA meeting

Concern over the national economy, over the gas industry's own future, and over day-to-day operating problems shared equal billing on a well-balanced program of the annual business conference of the New England Gas Association held in Boston recently.

Robert W. Otto, president of the American Gas Association, in one of the principal addresses, placed his finger upon a strange paradox brought on by the present trend toward overregulation of the gas industry. "Today business conditions are uncertain and millions of Americans are unemployed. The government is considering ways to prime the pump," he said. "Meanwhile, the gas industry, because of the cloudy legislative and regulatory picture that keeps it in the dark, finds itself unable to make its desired full contribution to the nation's economy.

"Many companies have been forced to postpone expansion plans because they just don't know where they stand. A cutback in the gas industry's construction program means that orders for steel pipe, compressors and other materials and equipment have been deferred or cancelled; it means fewer jobs for the workers required to produce materials and equipment and fewer jobs in actual construction operations; it means a slack in flow of dollars from one level to another and a consequent effect on our national economy as a whole. It's a dramatic example of chain reaction.

"The Federal government in its effort to prime the pump reportedly is planning to spend well over $4 billion for highways, irrigation, flood control, office buildings and other public works projects in the next fiscal year. That's an impressive sum of money, to be sure, but it is only twice as much as the gas industry spent last year."

Judge Otto also pointed to a way in which this overabundance of regulation is harming free enterprise by quoting from Donald Rogers, financial editor of the New York "Herald Tribune," as follows:

New officers of the New England Gas Association are (front row, from left) Incoming President Andrew W. Johnston, vice president in charge of operations at Boston Gas; Outgoing President Edgar G. Rhodes, president and general manager of New Britain Gas Light; 1st Vice President George R. Copeland, president of Algonquin Gas Transmission. Back row, from left: 2nd Vice President Gilbert J. Williams, executive vice president of Connecticut Light & Power; Treasurer Otto Price, vice president in charge of accounting, Boston Gas; and Clark Belden, clerk and managing director of NEGA.

"If the government is going to set the price of natural gas, thereby eliminating investment incentive, it is also going to have to put up the money to pay for necessary well explorations. Conversely, if the government wants private citizens to put up their money for gas explorations by investing in natural gas producing companies, then natural competitive forces should be permitted to determine the price charged for natural gas and the amount of profit accruing to the investors.

"If the free enterprise system has to be voted into existence all over again, here's the place to start."

The position of the gas industry was assessed from a number of viewpoints in a program billed as the "National Gas Industry Panorama." The viewpoints of the manufacturers were given by Clifford Coons, president of GAMA, and Harold Massey, managing director of GAMA. Seward Abbott of the AGA's Washington office gave a report on activities in that city. Others on the panel spoke on sales, advertising and research.

Generally, their remarks reflected optimism despite the present national economic picture.

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Make big profits running tested promotions that fit your business to a "T." Siegler supplies a complete package of material for each promotion and helps you run it.
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GAS Siegler PATENTED AUTOMATIC HOME HEATERS
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HAS THE MOST COMPLETE LINE OF GAS HEATERS for every need!

Your reputation for quality merchandise will be enhanced when you display and sell PEERLESS GAS FIRED CONSOLES because Peerless are gas heating specialists with over 70 years experience and a record for leading the field in smart designs, greater heating efficiency and maximum dollar value.

The RADIANT FRONT GAS CONSOLE

Only Peerless has exclusive Directional Louvres that provide best circulation and keep walls clean. This is only one of the many desirable features that sell Peerless . . . and keep it sold. A full range of sizes . . . 15 models in all . . . from the 14,000 B.T.U. "Mighty Midget" to the 65,000 "LowBoy."

The PLAIN FRONT GAS CONSOLE

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LIQUID WRENCH®
The super-penetrating rust solvent

LOOSENS
rusted bolts, nuts, screws, 'frozen' parts

Liquid Wrench works *fast*...yet is absolutely safe for all metals and alloys.

2171

*At Industrial, Automotive, Hardware, Plumbing Jobbers*

RADIATOR SPECIALTY CO.
Charlotte North Carolina

SOLDER SEAL

## Littlehales promoted by American Gas Association

Henry E. Littlehales has been named assistant director of public information for the AGA. Lorne S. Waddell, formerly with Tom Compere & Associates public relations firm, succeeds him as manager of press relations.

Before joining AGA in 1956, Mr. Littlehales was in PR work with Rowe-Doherty Associates, worked for the Philadelphia "Inquirer" and other newspapers in Pennsylvania and West Virginia, and taught journalism at Temple University.

## TV committee reorganizes, seeks more support

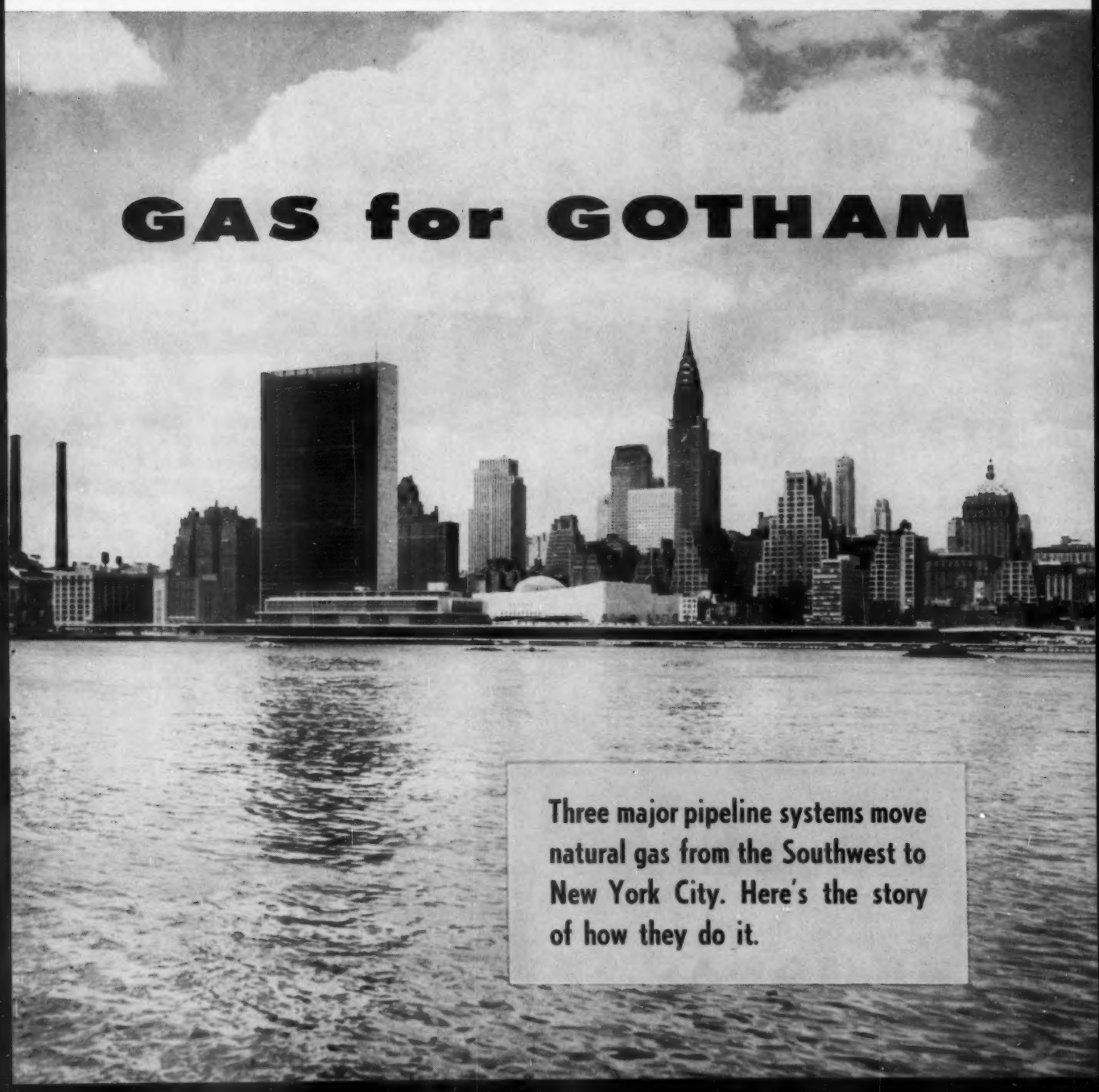
In a move to get more industry participation in its national television activity, the AGA has reorganized the national gas industry television committee.

The committee now will report directly to the AGA's PAR committee. It will be responsible for securing financial support and forming overall policy in connection with the TV program.

Dean H. Mitchell, Northern Indiana Public Service, heads the 29-man committee made up of top industry executives. Members include: Fred W. Batten, Columbia Gas System Service Corp.; Marvin Chandler, Northern Illinois Gas; J. H. Collins Sr., New Orleans Public Service; B. G. Duncan, Piedmont Natural; T. H. Evans, Equitable; C. H. Gueffroy, Portland Gas & Coke; J. J. Hedrick, Peoples Gas Light; Hansell Hillyer, South Atlantic Gas; D. A. Hulcy, Lone Star; F. A. Kaiser, Michigan Consolidated; Carl D. Kantner, Citizens Gas & Coke; T. H. Kendall, South Jersey Gas; Julius Klein, Caloric Appliance; W. H. Ligon, Nashville Gas; Charlton H. Lyons, Mid-Continent Oil & Gas Association; B. A. McCandless, Milwaukee Gas Light; John C. Peterson, Manufacturers Light; H. V. Potter, Oklahoma Natural; R. A. Puryear Jr., Alabama Gas; J. J. Quinn, Boston Gas; R. W. Ramsdell, East Ohio; W. F. Rockwell Jr., Rockwell Manufacturing; J. C. Sackman, Northern Indiana Public Service; E. D. Smith, Dayton Power; Wilmot O. Smith, Long Island Lighting; Guy Wadsworth Jr., SoCounties; and Tom Walker, Transcontinental Gas Pipe Line.

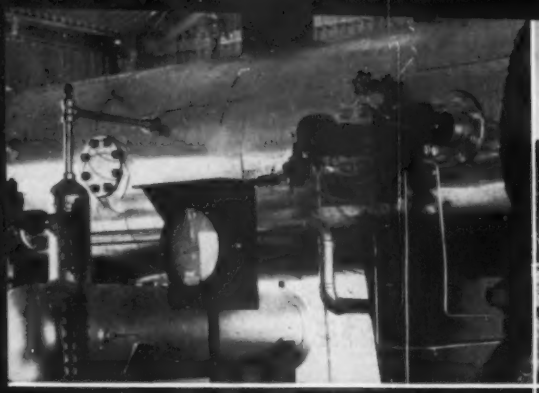
# GAS

PIPELINE SECTION



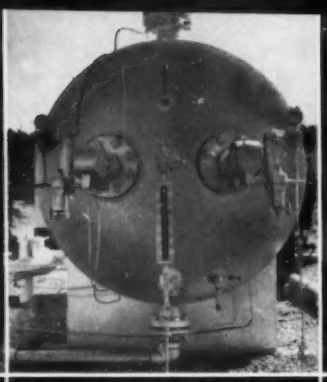
## GAS for GOTHAM

Three major pipeline systems move natural gas from the Southwest to New York City. Here's the story of how they do it.



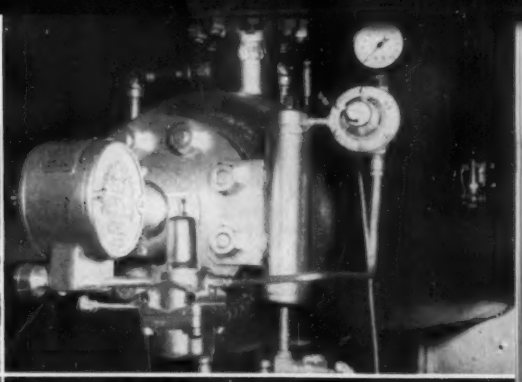
Controlling distillate and water on an LTX® unit in Mississippi.

Controlling oil production on High and Low Pressure Stage Separation unit in Louisiana.



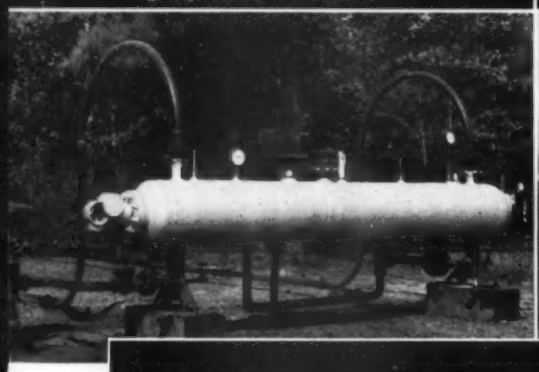
Controlling oil and water in a Monotube Oil, Gas and Water Separator in La.

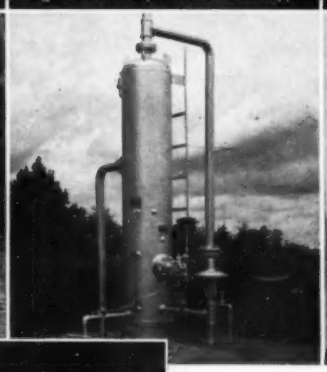
Controlling oil production in Vertical High Pressure Separator in Mississippi.

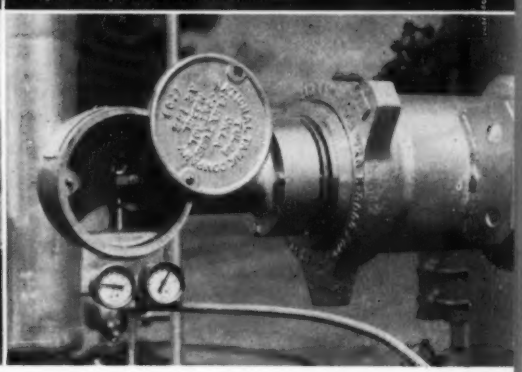


Controlling distillate production in a High Pressure Monotube® Separator in Oklahoma.

Controlling saturated glycol in contactor tower of Glycol Dehydration unit in Oklahoma.

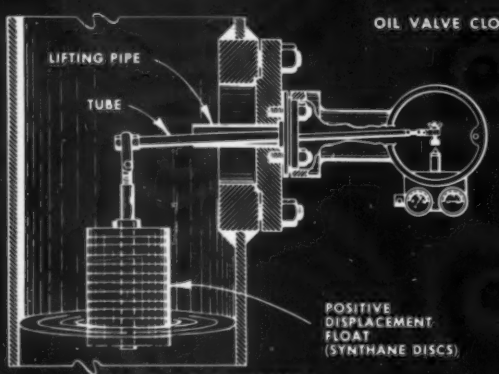






# WHY FLEX TUBE®

## is the most reliable liquid level control




FLEX TUBE ROD DEFLECTED UP
FLAPPER AWAY FROM VARIABLE ORIFICE
NO PRESSURE ON DIAPHRAGM OIL VALVE

Patented

- Accurate
- Trouble-Free
- Simple construction
- Easy adjustment
- No intricate stuffing box
- No precision rotating parts
- No knife-edge fulcrum points
- Positive displacement non-corrosive float
- All parts of stainless steel with cast aluminum case
- Accurate throttling control Or (where desirable) will intermit
- Reduces lag to minimum
- Maintains an inner-face between liquid hydrocarbons
- Working pressures from 0 psi to 6000 psi
- Pressure opening or pressure closing operation

**FLEX TUBE DESIGN IS BASED ON TWO FUNDAMENTAL PHYSICAL LAWS WHICH ASSURE QUICK, RELIABLE RESPONSE**

1. A cantilever beam will flex or bend when a concentrated load is applied to the end opposite to that which is securely fixed.
2. A solid body, or float, when immersed in a liquid, will decrease in weight by the weight of the liquid displaced.

**SIMPLE OPERATION**

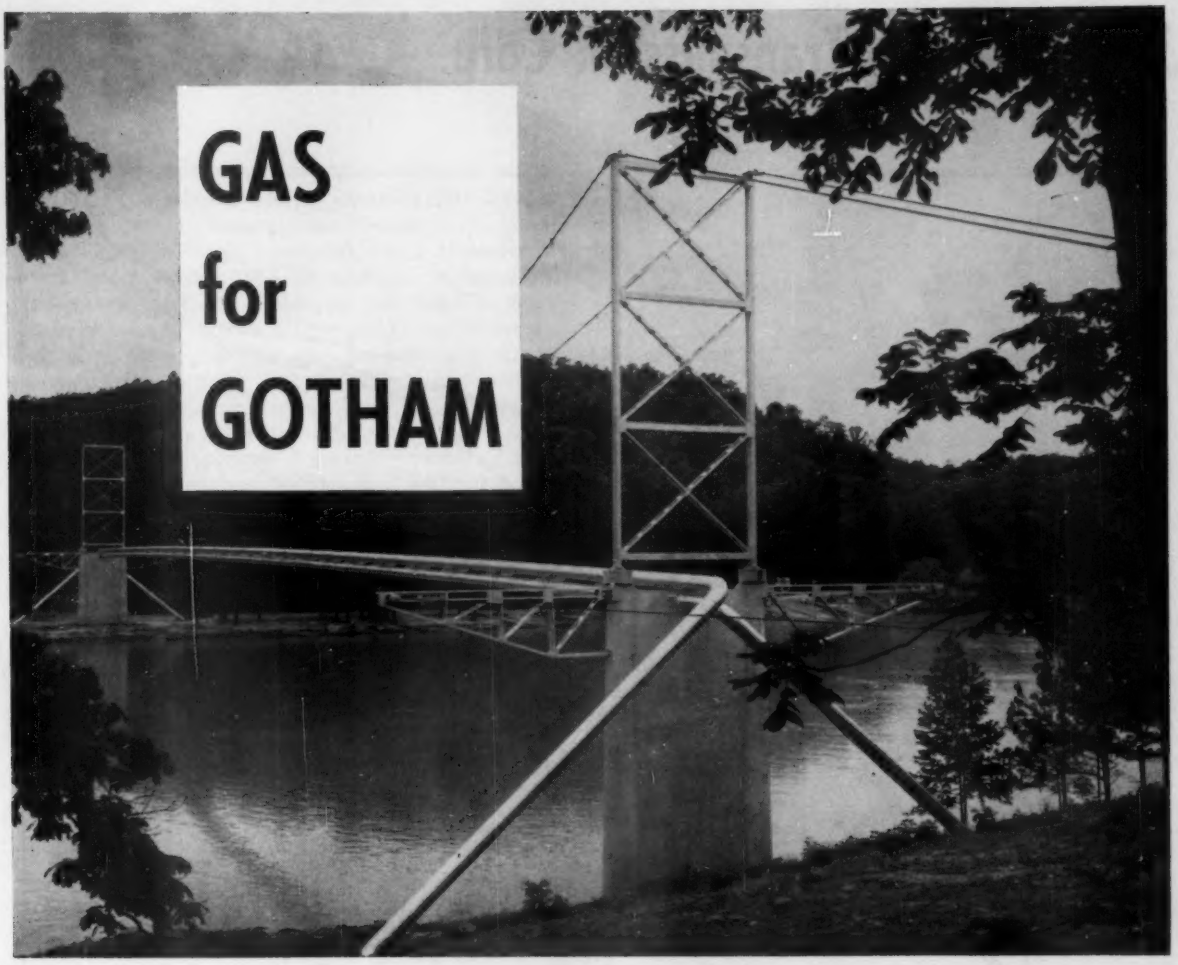
As fluid level rises, the compacted FLEX TUBE float discs rise, gradually closing the adjustable bleeder nozzle, causing a pressure build-up to the control line which activates the dump valve, and as level retires, the float discs follow for throttling or intermittent control.

**FLEX TUBE CONTROLS ARE AVAILABLE ONLY FROM NATIONAL.**

It's a National®

# NATIONAL TANK COMPANY

TULSA, OKLAHOMA




# Three major pipeline systems bring natural gas to New York

By J. FRED EBDON • Editor

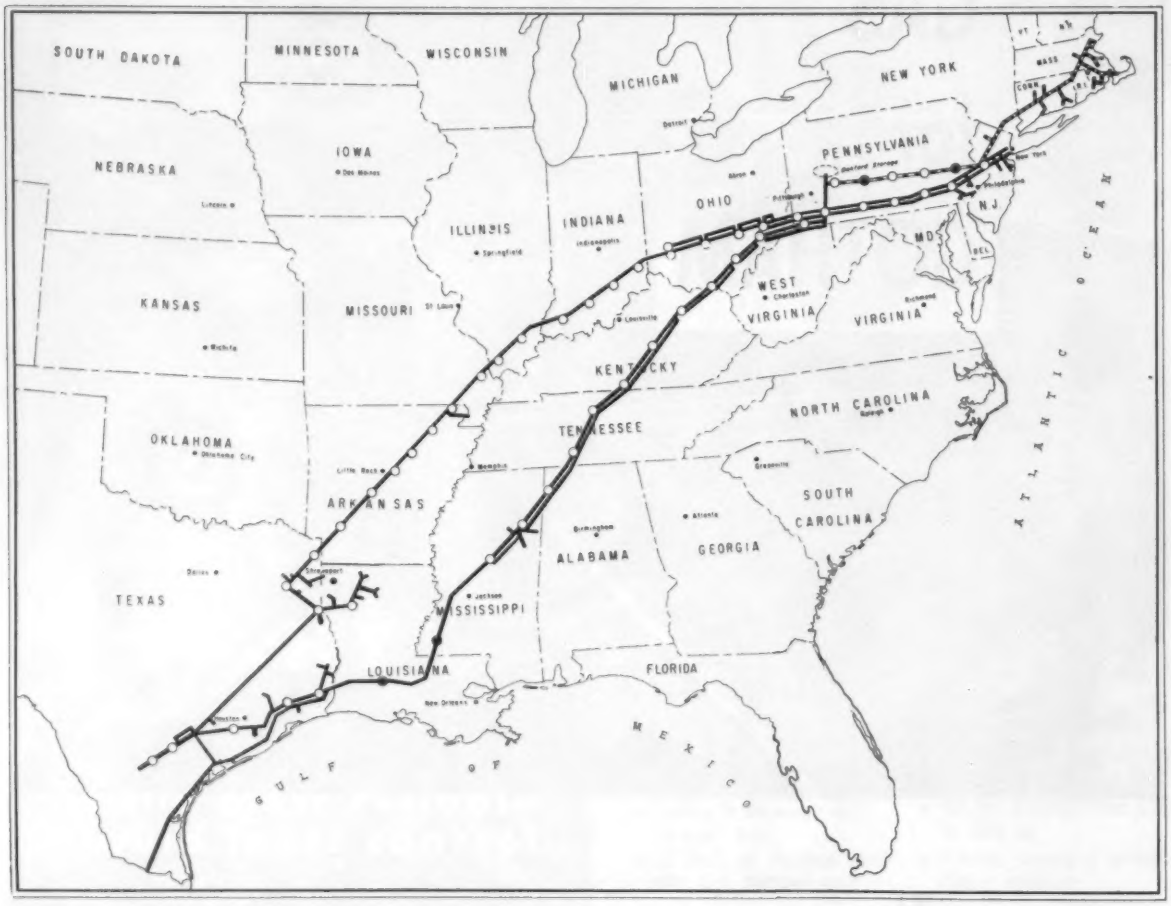
NEW York City is complex, ugly-and-pretty, and both locally tuned and cosmopolitan—but mostly it is big. People by the millions live and work in this massive city. Gotham has no equal—fortunately so, some say—in size and versatility.

From food to fuel, the story of New York City is the story of energy supply. The world's mightiest metropolis would wither and die without energy to fuel its life. Thus, the gas industry, as a major supplier of vital energy to Gotham, plays a major—but unsung—role in keeping "The City" going.

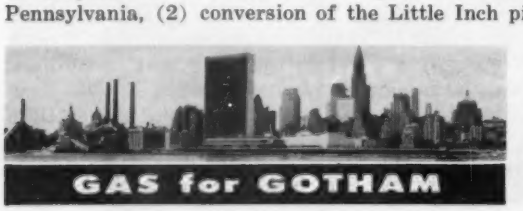
When winter's touch assaults Gotham with rain, sleet and snow in concert with zeroish temperature, it does not simply affect just those who live in, work in, or commute to the metropolitan area. The storm—usually credited as sweeping out of Canada, much to the chagrin of our friends to the north—must be anticipated by natural gas pipeline companies serving the area. And, after that, it means a lot of work by men and equipment in the correct place to do the job of bringing energy from the Southwest to Gotham.

Three large natural gas transmission systems pipeline this natural resource energy into metropolitan New York City. All are huge systems operated by active, progressive companies under excellent management.

# Texas Eastern Transmission Corp.




TEXAS Eastern Transmission Corporation, headquartered in Shreveport, is one of these suppliers. This company paid over $143 million for the Big Inch and Little Inch pipelines which were purchased from the Federal Government after World War II. Texas Eastern expanded and improved the efficiency of these lines as it integrated them with additional construction into one of the important natural gas transmission systems. Major milestones in this company's progress have been (1) construction of the Texas Eastern Penn-Jersey Transmission Corp. pipeline to tie-in operation of the Oakford storage field in western Pennsylvania, (2) conversion of the Little Inch pipeline to petroleum products service without reduction of total system natural gas capacity, (3) successful negotiations and constructions that permit Texas Eastern to import natural gas from Old Mexico. Thus, it is possible for natural gas purchased from Petroleos Mexicanos at the International Boundary—the Rio Grande river—near McAllen, Texas to find its way into dwellings on Staten Island.



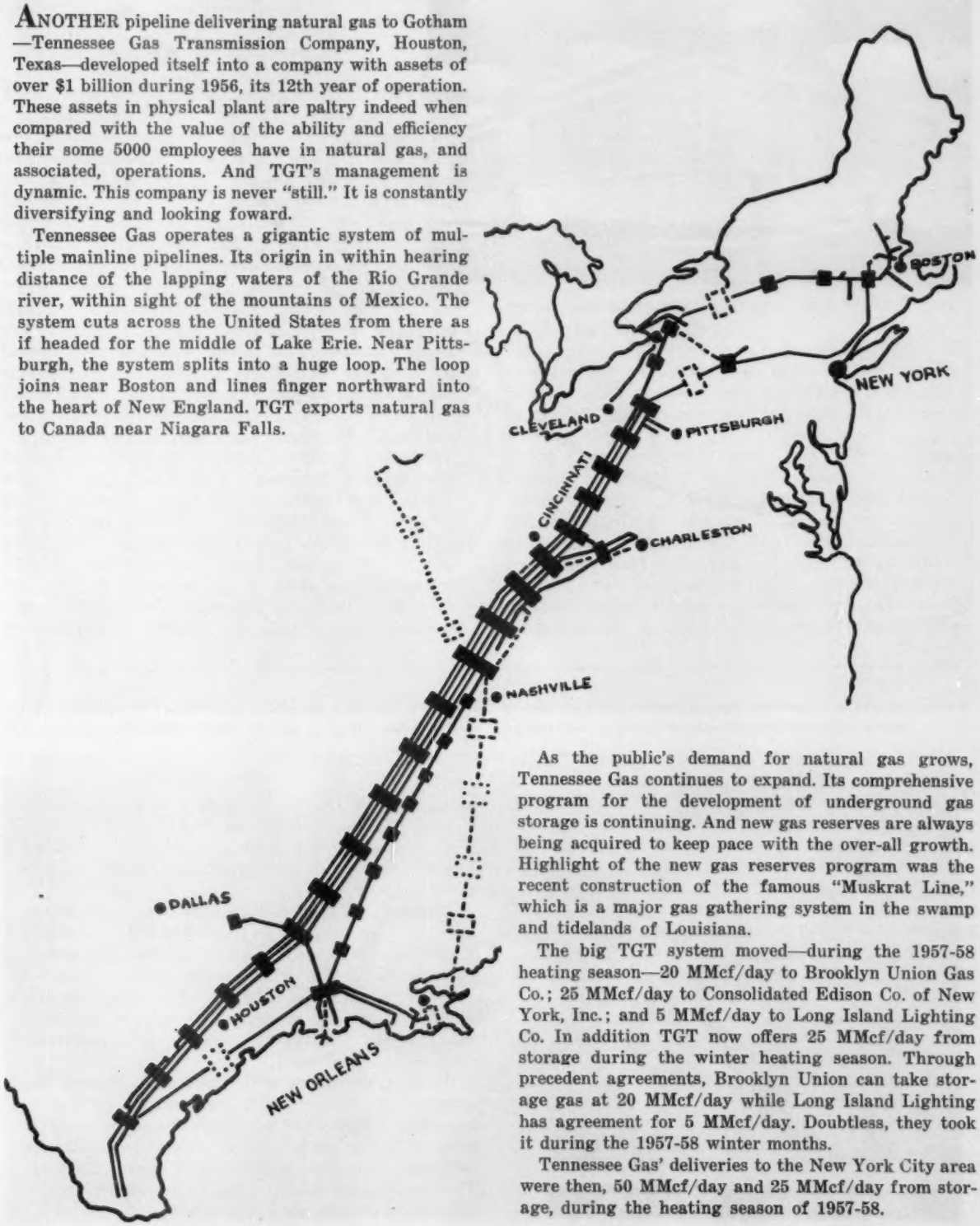

Texas Eastern's delivery into Gotham is relatively small. It is permitted by FPC to allocate 7780 Mcf/day into the New York City area during this—the 1957-58—winter. Gas is delivered to the Brooklyn Union Gas Co. on Staten Island after a Texas Eastern crossing of the Arthur Kill river.

The Texas Eastern system consists of two major pipeline networks. One is a 24-inch OD system; the other a 30-inch which is looped with 30-inch piping over essentially the entire route. Total system capacity is 1760 MMcf/day. And the company has a 100 MMcf/day expansion program in the hopper.

# Tennessee Gas Transmission Co.

ANOTHER pipeline delivering natural gas to Gotham —Tennessee Gas Transmission Company, Houston, Texas—developed itself into a company with assets of over $1 billion during 1956, its 12th year of operation. These assets in physical plant are paltry indeed when compared with the value of the ability and efficiency their some 5000 employees have in natural gas, and associated, operations. And TGT's management is dynamic. This company is never "still." It is constantly diversifying and looking foward.

Tennessee Gas operates a gigantic system of multiple mainline pipelines. Its origin in within hearing distance of the lapping waters of the Rio Grande river, within sight of the mountains of Mexico. The system cuts across the United States from there as if headed for the middle of Lake Erie. Near Pittsburgh, the system splits into a huge loop. The loop joins near Boston and lines finger northward into the heart of New England. TGT exports natural gas to Canada near Niagara Falls.

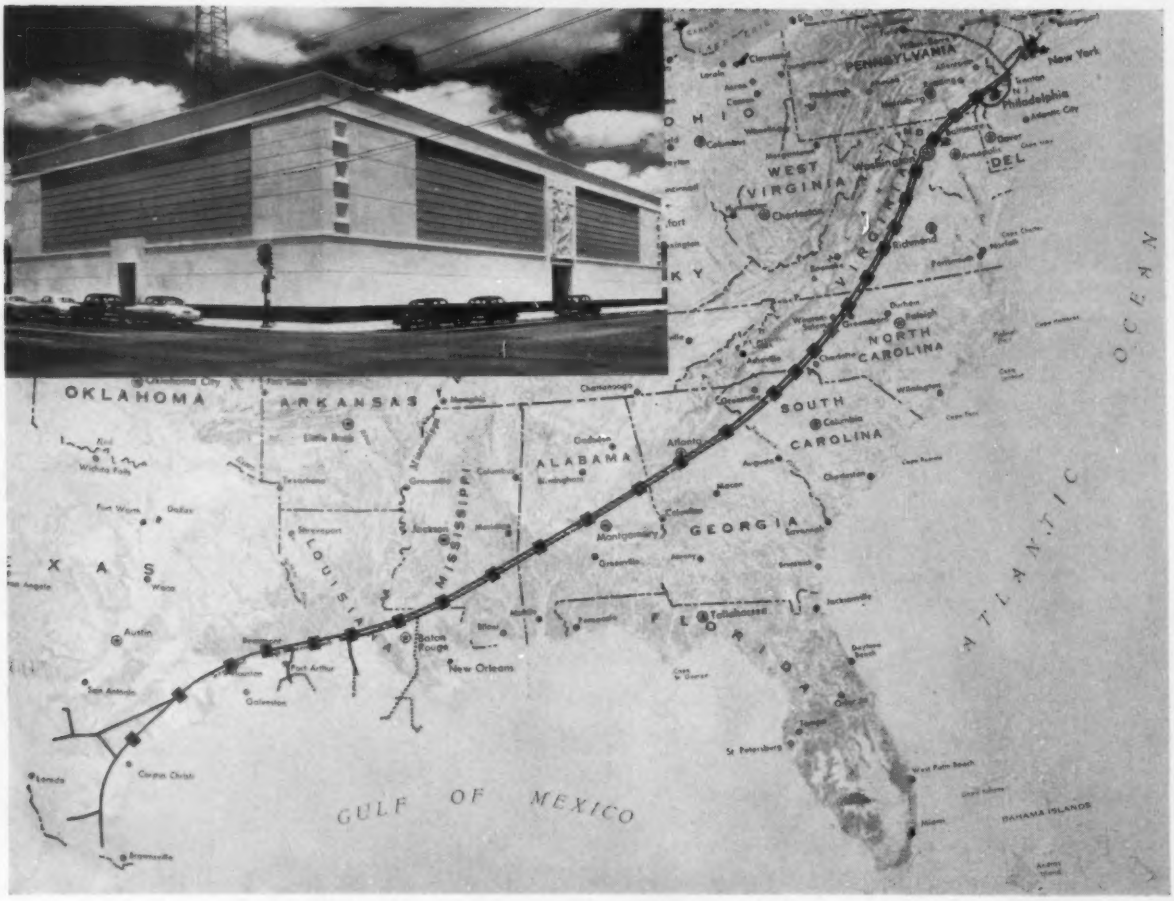



As the public's demand for natural gas grows, Tennessee Gas continues to expand. Its comprehensive program for the development of underground gas storage is continuing. And new gas reserves are always being acquired to keep pace with the over-all growth. Highlight of the new gas reserves program was the recent construction of the famous "Muskrat Line," which is a major gas gathering system in the swamp and tidelands of Louisiana.

The big TGT system moved—during the 1957-58 heating season—20 MMcf/day to Brooklyn Union Gas Co.; 25 MMcf/day to Consolidated Edison Co. of New York, Inc.; and 5 MMcf/day to Long Island Lighting Co. In addition TGT now offers 25 MMcf/day from storage during the winter heating season. Through precedent agreements, Brooklyn Union can take storage gas at 20 MMcf/day while Long Island Lighting has agreement for 5 MMcf/day. Doubtless, they took it during the 1957-58 winter months.

Tennessee Gas' deliveries to the New York City area were then, 50 MMcf/day and 25 MMcf/day from storage, during the heating season of 1957-58.

# Transcontinental Gas Pipe Line Corp.




TRANSCONTINENTAL Gas Pipe Line Corp., Houston, Texas, delivers about 85 per cent of the natural gas that reaches Gotham. Its FPC allocations for winter 1957-58 was 118,938 MMcf/day to the Brooklyn Union Gas Company; 11.5 MMcf/day to Brooklyn Borough Gas Co.; 143,722 MMcf/day to Consolidated Edison Co. of New York, Inc.; and 50,570 MMcf/day to Long Island Lighting Co. for a total of 324,730 MMcf/day for the New York City area. In addition, Transco now offers 22,487 MMcf/day from storage on peak days and will increase this to 118,487 MMcf/day storage gas in time for the heating season of 1959-60.

**GAS for GOTHAM**

Since Transcontinental Gas Pipe Line Co. is by far Gotham's largest natural gas supplier, let us take a look at the men and equipment that are behind this pipeline operation.

Transcontinental Gas Pipe Line Corp. is headquartered in a beautiful modern building a short distance out from "downtown" Houston. The building is completely windowless, which points up its controlled climate and lighting facilities. The offices are unusually tastefully appointed. A microwave tower reaches high into the air over the imposing structure.

However, as modern as the building is, Transco has outgrown it. Personnel are scattered out in nearby, temporary offices awaiting completion of an addition planned for the main building. Life is not too hectic at Transco. The atmosphere is one of relaxed efficiency. The Transco people in this big, Southwestern city are friendly, courteous, and hospitable.

# The history of Transco

THE origin of Transcontinental Gas Pipe Line Corp. is indirectly linked with that of Texas Eastern Transmission Corp.—both were bidders for the purchase of the "war surplus" Big Inch and Little Big Inch pipelines from the War Assets Administration. Texas Eastern's bid was higher, so they got the lines. But the Transco group had filed with FPC for a certificate to build a pipeline from deep south Texas to the East Coast in the event that their bid did not win the Inches.

The driving force behind these plans was the late Claude A. Williams, of Longview, Texas. He and a few close associates formed Trans-Continental Gas Pipe Line Co., Inc. in 1946 to bid for the government-owned pipelines. When they lost out, they swung into the Texas-East Coast project. FPC handed them a certificate on May 29, 1948.

Transcontinental Gas Pipe Line Corp. was then formed, took over the business of Trans-Continental, and took off on the long line construction phase with Mr. Williams in the president's chair. Then, the deft touch of Ray Fish was brought into the project for design, engineering, construction and logistics. The Fish Engineering Corp., Houston, was awarded contracts for these phases of the $190 million, longest (then) single-project pipeline ever built. A Fish Engineering subsidiary, Fish Construction, Inc., was organized specifically for the Transcontinental construction work.

Full scale spreadwork broke out in June 1949. They got 600 miles of 30-in. OD line pipe in during the year. And five compressor stations were put under construction.

Construction really rolled in 1950. Fourteen spreads (six were used in '49) laid over 1200 miles of mainline; 500 miles of sales and gathering lines; seven compressor stations were completed while 12 more were started; and some 2300 miles of pipeline were proved out through pressure testing.

On Jan. 16, 1951, Transco started delivery of natural gas from the great Southwest to New York City in Manhattan. The initial deliveries were 125 MMcf/day but this quickly increased and has never ceased being increased since.

The Transcontinental system was then a single 1800-mile long 30-in. OD tube. From Texas' Rio Grande valley it worked its way northeasterly, passing just west of Washington and Baltimore, skirting the northern tip of Philadelphia and Trenton, and cutting through the heart of Newark. At the Hudson Palisades, it dipped under the river and came out at the 134th St. metering station, located on the east bank adjacent to Manhattan. A master pressure control station was

Transco launched it 6500-ft Narrows crossing from this spot on Staten Island. One 800-ft length of pipe is in the water with pontoons in place, another is being prepared for pulling. The crossing line delivers gas to Brooklyn Union's distribution system.

TOM P. WALKER

# Transco's management

E. CLYDE McGRAW

THE foresight of Transco's management is a pattern for the gas industry. For example, this company negotiated rate increases with nearly all important customers, and won approval for them from the Federal Power Commission, nearly two years ago. This, through foresight and fortune, enabled them to operate up to and through the Memphis decision without additional rate increase applications and collection under bond. And since it originally went into operation, the company has kept itself among the leaders in a gas industry marked by fine pipeline operating companies.

## DIRECTORS

Clyde H. Alexander
Dallas

Ray C. Fish
Houston

Alfred C. Glassell, Jr.
Houston

N. V. Kinsey
Shreveport

E. Clyde McGraw
Houston

Benno C. Schmidt
New York

Franz Schneider
New York

Joseph J. Snyder
Boston

Tom P. Walker
Houston

## OFFICERS

Tom P. Walker
Chairman of the Board

E. Clyde McGraw
President

John F. Burton
Financial Vice President

R. Stewart Bruns, Jr.
Vice President - Marketing

Walter H. Davidson
Vice President - Operations

James B. Henderson
Vice President and General Counsel

Roger D. Stanwood
Vice President - Gas Supply

Luke V. Patrick
Controller

William M. Rice
Treasurer

Tom H. Wheat
Secretary

## KEY OPERATING PERSONNEL

F. B. Haverfield
General Superintendent

E. N. Armstrong
Superintendent Gas Measurement & Dehydration

Ted Springer
Superintendent Gas Control

J. J. Corrigan
Superintendent Pipeline

Raymond H. Crowe
Chief Engineer

John C. Boehm
Superintendent Compressor Stations

H. A. Rhodes
Superintendent Communications

located at Linden, N. J., which serves as the terminal point of the mainline.

The New York utilities did not show signs of breathing easy with this long single line as the only supply into Gotham. So, even before the Hudson river crossing was completed, Transco's engineers were designing a second entry into the metropolitan area. This project was completed in December 1952. It is a 26-in. OD lateral that takes off from the Linden pressure control station, passes under the Arthur Kill, runs across Richmond (Staten Island), and submarines under the Narrows into fabled Brooklyn.

The Narrows is not narrow, as far as pipeliners are concerned. In getting under it, Transco appeared for a time to be courting disaster. But they made the 6600-ft crossing—the longest underwater crossing ever attempted—that involved a maximum depth of 108 ft.

In early 1953, Claude A. Williams resigned from the company. Tom P. Walker, of New York, was elected president and a director of the company on April 22 of that year. The capacity of the line was increasing; a 59-tower microwave system had been installed; and additional compressor station horsepower had been installed and more was under certification. This work can all be credited to the initial phase of the system's construction.

In 1954, FPC authorized the company to expand its system. Transcontinental invested $10.5 million in new facilities that year and made the first use of 36-in. OD for a mainline, high pressure application.

During 1955, looping and addition of compressor horsepower raised the system capacity to 705 MMcf/-day. An additional 329 miles of 36-in. pipe was installed, based on the successful use of it the previous year. During the heating season 1954-55, Transco started delivering natural gas from underground storage to its New York City customers. The company had expended a great deal of effort in previous years exploring for suitable water sands in and around New Jersey. They were not successful, so they chose the alternate of contracting with Texas Eastern Transmission Corp. for use of the latter's Oakford storage field near Pittsburgh. Thus, peaking gas was delivered from underground storage to Linden, N. J.

Expansion continued through 1956. The allocated capacity was increased 754 MMcf/day, with an additional 136 MMcf/day being available from storage. A program to increase the daily capacity by another 80 MMcf was started in '56 and carried over into 1957.

Also in 1956, E. Clyde McGraw, executive vice president, was elected to Transcontinental's board of directors. Then, in early 1957, Ray C. Fish, chairman of the board of the Fish Engineering Corp., joined Transco's board. Tom P. Walker was elevated to Chairman of the Board in April 1957, and Mr. McGraw was named president.

And 1957 was another year of building the system to render still more and better service to the markets. Construction was highlighted by Transco's first lateral into the productive offshore region of the Gulf of Mexico. The microwave communications system was changed over to a simpler, more efficient tool providing 24 voice channels in place of the original 12.

Another view of the Narrows crossing construction. Skyline of New York City is seen in background.

By the end of 1957, Transco had 3937.37 miles of pipe in the system, 336,160 compressor station horsepower, income of near $100 million annually, 1600 or so permanent employees, and gas sales of about 300 billion cu ft per year—certainly dynamic growth in just eight years.

But there's no rest ahead for the big pipeline company. Since the company first delivered natural gas into Manhattan, in January 1951, Gotham has remained its principal domain. While other major companies have been broadening their markets, geographically, Transco has concentrated most of its efforts on increasing deliveries to this small, though vital, segment of the United States. And Gotham's yen for more natural gas is not satisfied. Nor will it be so, by the best conservative estimates available, for the next 12 years at least.

Looking at Transco's New York City markets, what has gone before is only prologue; the best is yet to come.

While the first flurry of load-building is over, and the leaping increases in natural gas usage that followed distribution companies' conversions have slowed a bit, a new era of intensive market development has opened.

The curve of combined sales has steadied, but the angle of ascent is still sharp. When will it flatten out into a "normal" growth line? That is not likely to be answered for a decade or more.

Aside from the practical limitations of market saturation, what limitations are there on the possibilities of future growth? They are these: the right amount of gas, at the right time, at the right price. What are the prospects?

Says Transco's Vice President-Marketing, Stewart Bruns: "We have an unlimited potential of gas, and feel we can offer various types of service that will make its use economic to the growing market that we serve."

Transco at the end of 1957 had completed a construc-

tion program which increased system capacity to 948 MMcf/day from last year's 754 MMcf. A subsequent program, filed with FPC last October, called for the outlay of $170 million and an increase in allocated capacity to 1180 MMcf/day *exclusive of storage.* This will virtually complete the looping of the company's mainline all the way from Texas.

The only real fly in the ointment would seem to be price. The utilities are building enormous peaks, and the gas needed to supply them is extremely costly. Even for firm use, the price of natural gas has been rising. Yet volume is still the important factor in gas sales economics. Where Con Edison has been hurting most is in sales to *minimum-use* customers. It recently applied for, and was granted, a minimum rate increase (300 cu ft) to $1.50. In contrast, Brooklyn Union has been able to show what can be done with volume sales. Not only has the company been able to absorb increases from suppliers, but it has actually cut its househeating rates several times. And when BU took over Kings County and New York and Richmond last year, it put through a broad rate reduction amounting to nearly $1.5 million.

What the utilities need most is not cheaper gas but *more natural gas* at peak loads at a reasonable price. This means more storage—more convenient storage, with higher maximum rates of withdrawal—and shorter runs from the field.

Today, Transco has rights in Oakford field, near Pittsburgh, for storage of 12 billion cu ft per year. This has been a tremendous help, but the need for more gas, closer in, is acute.

Included in Transco's latest docket is a request to join in with Texas Eastern and New York State Natural in developing the Leidy and Tamarack fields near Renovo, Pa. for natural gas storage. If successful, this would cut a hundred miles off the storage route.

Leidy is a producing field operated by New York State Natural Gas Corp. The three companies propose to set up a "partnership" in the field, New York State keeping one-half of it, and Texas Eastern and Transco each a quarter. Transco will build a 193-mile line from Princeton, N. J., to transport gas from this point splitting the other half into quarters.

Transco's share would hold up to 15 billion cu ft and, according to the plan, the company could start drawing from this bank by November 1959. Initial rate would be 180 MMcf/day, of which 85 million would go into central New York City. Brooklyn would take 40 million, Con Edison 30 million and Long Island Lighting 15 million.

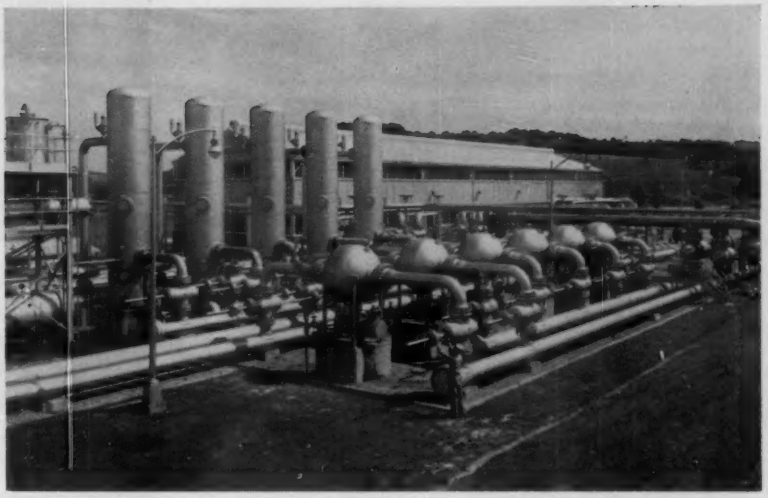
Combining Oakford storage deliveries and proposed Leidy deliveries, there develops a proposed peak day system allocation of 1,507,653 Mcf, which could be realized within little more than a year. In anticipation of an approval of the Leidy project, Transco has already bought and set up in storage lots more than 50 per cent of the mainline pipe that will be required.

Transco is still searching for a close-in field with high-peak, short-term deliverability. The best bet at this moment appears to be Harvey's Lake, between Wilkes-Barre and Scranton, Pa., about 100 miles from New York. Over the past three or four years, a handful of wells in this field have been producing small volumes for delivery to Pittston, Pa. With proper development, this field might put out high-peak deliveries over a 15- or 20-day stretch.

Another aspect of the latest docket is the proposal of Con Edison to buy its own supplies in the Southwest and contract with Transco for the transporting of them. Con Edison plans to buy 50 MMcf/day on this basis. This gas would be used in its electric generating stations. It would, according to the terms of the proposal, help Con Edison realize economies in the generation of electricity and help reduce smog in the city of New York.

This service would be completely curtailable for 60 days per year. However, Con Edison would reserve the

General view of Oakford (Pa.) storage pool. It is jointly owned and operated by Texas Eastern and New York State Natural. Transco has contracted with the owners for storage of gas to meet peak winter demands.



Gas withdrawn from Oakford storage field is run through these scrubbers before being channeled into mainline for delivery to customers. Compressor building is shown in background.

right to buy gas for resale from Transco during such curtailment periods, up to an amount equal to the volume curtailed.

Such an arrangement would have certain advantages for both sides. Con Edison could pay the producers the best price it could get. There would be no favored nations clauses to escalate prices. Possible higher prices would not have to be diluted throughout the Transco system. Presumably, the "Memphis decision" would have no effects upon this gas. Transco would be unhampered by "allocation" disputes.

Long Island Lighting has a similar plan in the works, although this would be on a firm delivery contract. It would simply put some more top on the company's gas sendout.

In general, how does the future shape up for Transco, year to year?

If things go along about as expected, Transco should add 100 million a day firm through the foreseeable future. On top of this, storage deliveries should increase at a comparable rate. At this rate, the company should be up in the 2 billion-ft class in four years.

Not bad for a company that served its first gas just a little over seven years ago.

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Operator monitors Oakford storage field meter run constantly. All injections and withdrawals are recorded on this board.

# Transco's problem of gas control

Ted Springer (standing), superintendent of gas control, monitors Transco's system from the gas control center in Houston.

GETTING gas into New York from sources over 1800 miles away is something like putting together a gigantic jigsaw puzzle of constantly changing dimensions. Hundreds of factors of supply and demand must be fitted together precisely in order to meet the needs of all Transco's customers while maintaining a close-to-100 per cent load factor.

The pieces in this picture are scattered all along the mainline, at laterals and intermediate points, at the storage fields, and at interchanges with other major gas transporters. What Con Edison wants today vitally affects how much Brooklyn Union can have. Yet the reverse is just as surely true. While carefully calculating the needs of these two, Transco must also weigh the demands of a dozen other utilities. It must figure optimum draw from storage, tot up available emergency supplies, plot out patterns for interrupting certain industrial customers as necessary.

With all these, and many other factors to consider, results are uniformly excellent. Through scientific use of men and instrumentation, the whole picture is assembled with surprising ease.

As gas in Transcontinental's system nears the heavily populated areas stretching from Philadelphia to Newark, portions of it are diverted to utility and industrial customers. Near Malvern, Pa., a 20-in. sales lateral takes off toward Marcus Hook, crosses the Delaware river into Delaware and Southern New Jersey, cuts sharply northeastward through the Wilmington and Camden areas, and cuts north again through Trenton to rejoin the mainline. This line feeds Philadelphia Electric Co. at Chester; Delaware Power & Light at Wilmington; South Jersey Gas Co.; Philadelphia Gas Works, and parts of the southern and southwestern sectors of Public Service of New Jersey. Large industrial customers served along this route include Sun Oil Co. at Marcus Hook, Pa., and Hydrocarbon Research in south Jersey.

Along the mainline, Transco also makes some large-scale deliveries. Philadelphia Electric takes gas near Conshohocken, Pa. Philadelphia Gas Works takes at a point near the city which it serves.

There are also tie-ins with Manufacturers Light & Heat at Downingtown, Pa., and with Texas Eastern at Skippack, Pa. and Princeton, N. J. These links can be used to take or deliver gas.

Once the gas is past these points, it feeds into the Transco nerve center at Linden, N. J., just south of Newark. Here Transco has a tie-in with Texas Eastern, which can bring in gas from storage at Oakford during winter and send it to storage in the summertime.

From Linden, one mainline heads north to Riverdale, N. J. where it ties in to the Tennessee Gas system. Through this connection, gas can be transmitted to Tennessee Gas—or even, in case of emergency (such as happened late last fall) to the Algonquin system, which serves New England.

Another line skirts the west bank of the Hudson and crosses into Manhattan at 134th St. This is the original New York feeder. Still another line cuts east from Linden, crosses the Arthur Kill into Staten Island, dips under the Narrows and emerges in Brooklyn.

In addition to these take-offs from the Linden dispatching station, there are several other delivery points which feed gas into the companies on the outskirts of New York—Public Service Electric & Gas Co. of New Jersey, for example, and Elizabethtown Consolidated.

All these laterals, take-offs, and trading points give the system a great deal of flexibility. While they complicate the dispatching task at Linden—and at Houston—they are invaluable in balancing out demands.

For New York, Linden holds the key.

On a peak day, Linden might have the job of allocating more than 400 MMcf of mainline gas. To this it might be able to add up to 136 MMcf per day from storage. Then there is emergency gas—winter peaking service gas—which was available in volumes up to 40 MMcf per day during the past winter.

The great bulk of the gas that feeds through Linden is on a firm contract, so dispatching is automatic. Nearly 325 MMcf is fed in at two points of entry—143.7 MMcf for Con Ed; 118.9 for BU; 11.5 for Brooklyn Borough; 50.6 for Long Island Lighting Co. In addition, if it's a cold day, the customer companies may call for as much as 22,487 Mcf from storage. Then,

there are allocations of what is termed "limited temporary firm" gas—supplies which Transco is able to allocate on a firm contract for this winter only.

At the very tip is the "winter peaking service" gas, which is allotted to the various New York utilities on a winter-to-winter basis.

A pipeline system must do more than simply move gas. It must know how much gas it needs to purchase from which producers, what volumes the individual utility customers need during a specific day, what pressures must be maintained at a number of points, and the "pulse" of the operating functions must be constantly monitored.

Transcontinental Gas Pipe Line's operating "brain" is the Gas Control department. The nerve system is a 1840-mile, company-owned and operated microwave radio communications system. Gas Control's main duty —to keep a balanced flow of gas in Transco's system that operates at practically 100 per cent load factor the year 'round.

Houston is the center of Transco's gas control. Here, data flows in constantly detailing the state of the vast pipeline system. Up east, the Linden gas control station is the key to liaison with the New York City consumers.

Ted Springer, superintendent of gas control, heads the department and is based in Houston. Cliff Thrailkill is the assistant superintendent. They and their dispatchers have to know how to work with people. They must coordinate the activities of several operating departments to keep the gas on its way to Gotham and other sales points.

John Coker is the senior dispatcher stationed at Linden. On a scheduled basis, the gas companies in Gotham call Linden station on leased Bell system wirelines every two hours to give their takes and information on anticipated demands. On severe weather days the coordinating calls may be made at increased frequency. When trouble seems to be around the corner or is being experienced, Linden is in essentially constant contact with the utility or utilities involved.

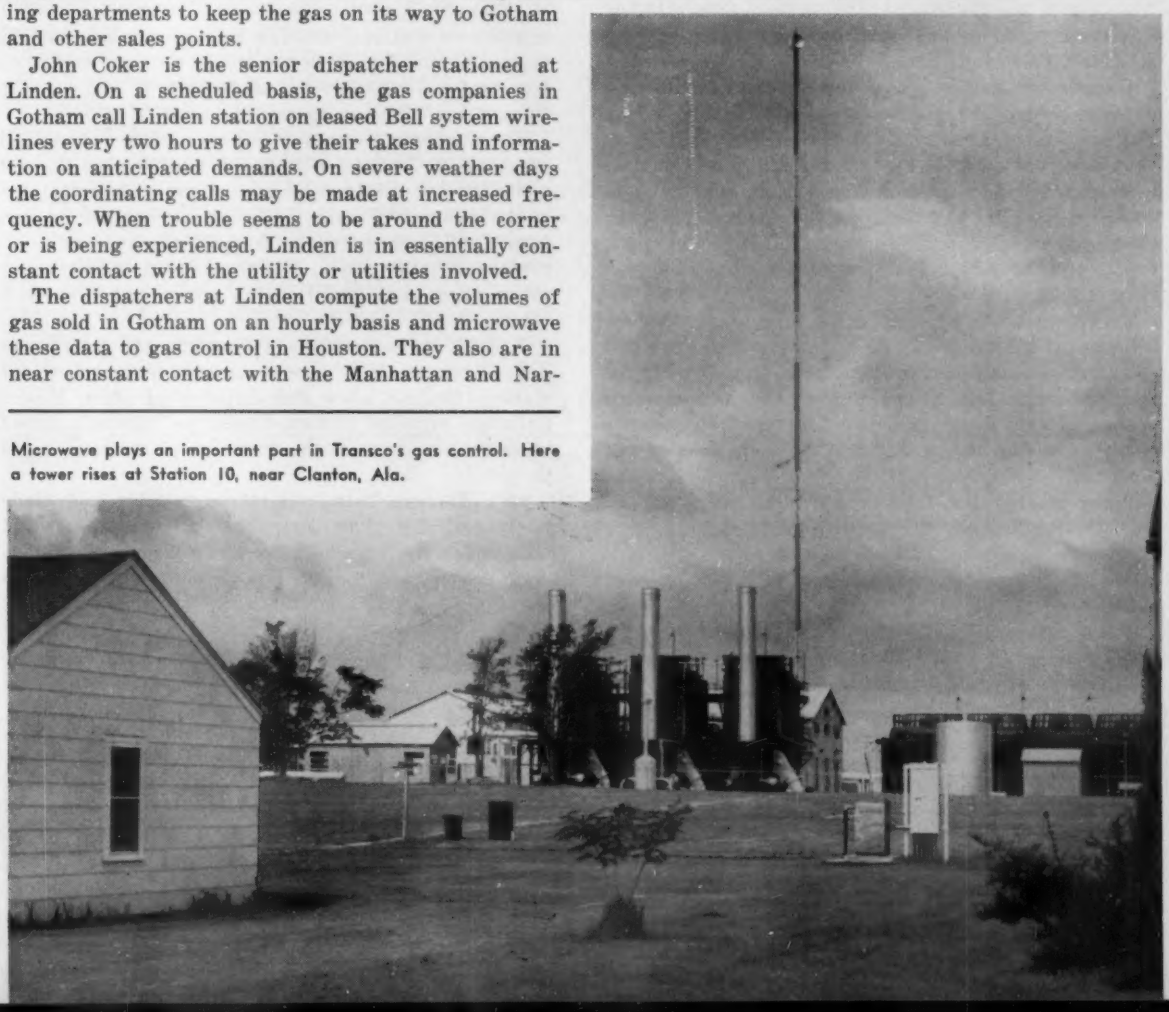
The dispatchers at Linden compute the volumes of gas sold in Gotham on an hourly basis and microwave these data to gas control in Houston. They also are in near constant contact with the Manhattan and Narrows measurement and pressure control stations to regulate pressures and volume rate of flow.

Down in Houston, gas control is the collecting point for pressure and flow data from Transco's New York City delivery points as well as for sales points all along the line. But their duties go much further than this.

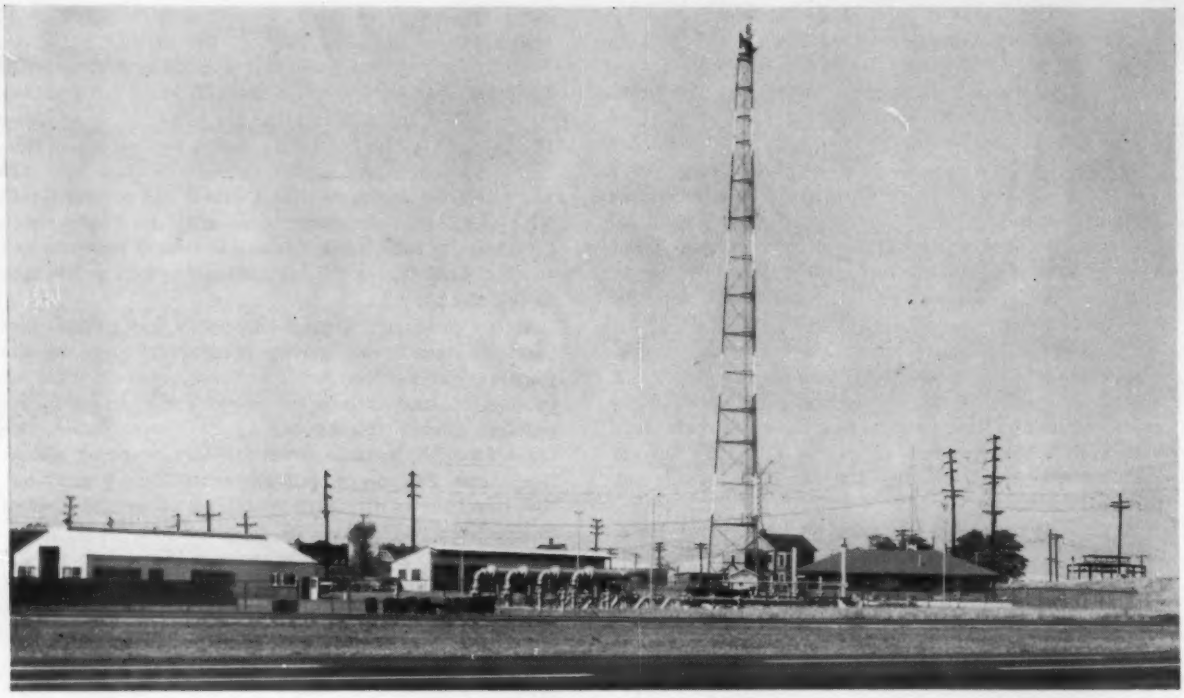
For instance, gas supply department has over 119 gas purchase contracts. Gas Control has to coordinate with Gas Supply in order to schedule purchases from producers to satisfy the various contracts involved and to determine where the most advantageous prices will be for the period.

Every producer contacts Transco's gas control dispatchers once a day giving volume delivered to the pipeline during the last 24 hours, current rate of production, and anticipated production for sale to the pipeline during the impending 24 hours. Again, the takes from the various producers are based on allocations from gas supply, but gas control must carry out the directions with the dispatching of orders needed to effect the physical action required.

Gas control is the source for running orders for all of the 23 mainline compressor stations. Each hour, the mainline stations microwave in their suction and discharge pressures, gas conditions, atmospheric conditions and other information pertaining to routine or special operations at each station. Gas Control then processes these data to assure smooth coordination with the Compressor Stations department, pipeline



Microwave plays an important part in Transco's gas control. Here a tower rises at Station 10, near Clanton, Ala.



Transco's Linden (N. J.) station is the hub of gas supply for Gotham. Here natural gas from the Southwest is routed to the distribution companies serving greater New York.

department, and measurement department in providing scheduled movement of gas in the system.

Compressor station personnel keep the Houston dispatchers posted on any unusual condition in any of the 149 compressor units. Should they need to unload or shut down one or more engines for emergency or routine inspection, maintenance or repair, they request and receive orders to do so from Gas Control. And Gas Control is actually in the best position to pick up malfunctioning in compressor station or pipeline operations.

Transcontinental's policy is to keep its customers informed if abnormal conditions turn up in the system. Gas Control does this through Linden. The dispatchers also coordinate operations during the annual compressor station overhaul period, during the construction season, and during maintenance operations on the pipeline.

When making hot taps or welds on the line, the company has a policy that provides lowering the pressure to under 500 psig. This is another of the considerations that the Gas Control personnel must activate.

Gas Control also logs the movements of Transcontinental's airplanes. It does not dispatch them, but keeps a running record of where each one is, where those in flight are destined, and departure and estimated arrival times, etc. Aerial patrol and personnel planes can contact the nearest compressor station by radio and then can be switched to the microwave system so that the dispatchers can be appraised of unusual conditions observed and can take action as required.

And Gas Control furnishes data as needed for calculating efficiency of the pipeline system and the compressor stations, etc. The Engineering department often has need for some specialized data for engineering studies. Other departments have to call on Gas Control for data and operating statistics.

The diversified communications system owned and operated by Transco is certainly vital to Gas Control and other operations. Backbone of the communications is the microwave radio net. This all-weather system ties-in all compressor stations, all pipeline and compressor division offices, and the Linden, Newark and other offices with the Houston offices and with each other.

A VHF radio system supplements the microwave links. There are VHF base stations at each compressor station, division office and dispatching office. Mobile units are provided in cars, trucks and aircraft. All of these resources are at the fingertips of the gas control people.

New Yorkers, then, pass through their cold spells never realizing that throughout the year, day and night, men in Transco's Gas Control department are assimilating data constantly and are taking action as necessary to assure the continuity of gas service that the industry's consumers have come to expect as automatic. Transcontinental dispatchers in Linden and at Houston are especially alert during the eastern cold waves. They live through them with the New Yorkers. In most cases, their experience and science allows them to anticipate and make corrections for trouble before it happens. When they have a real emergency, they know what to do and have the flexibility in Transco's system to carry on through it with few, if any, of the ultimate consumers being inconvenienced.

# Pipeline department

THE Pipeline department has the responsibility of the "care and feeding" of the pipe, the right-of-way, and the pipeline structures of the system. It is constantly looking for factors that might cause trouble to the piping. When they find it, they correct it before the trouble can cause a pipeline outage.

Transco now has about 325 men in the Pipeline department. These men do a variety of work. In addition to routine pipeline maintenance, they are the trouble shooters who fight dust, rain, snow, and floods to keep the pipeline system in top operating condition.

There are five divisions in the Pipeline department. There are two districts under each division. Each district has three crews. A pipeline crew has a foreman, a truck driver and four or five maintenance men. A crew normally maintains 40 to 50 miles of pipeline. However, Transco has crews that work up to 90 miles of the system.

Each crew has a pickup truck, a three-ton truck, and a farm-type tractor with most of the farm implements. Then, the district superintendent at his headquarters will have one or two welding sets, a heavy 10-ton truck, a sideboom-equipped crawler tractor, a bulldozer equipped tractor, and a backhoe or dragline. The districts and crews can reinforce each other with both men and equipment as needed. Such cooperation is carried over among the divisions.

To maintain the pipeline, it is patrolled from the air once a week. Once a year, the entire line is walked. The purpose is, of course, to look for trouble or for things that might cause trouble. As a result of these patrols, the Pipeline department might have to go out and cut brush off of the right-of-way; fill in where backfill has sunk; plant grass or shrubs to stall wind erosion; install drains or bulkheads to prevent streams from washing out the line, etc. Dead vegetation might mean that a valve is leaking or there is a leak elsewhere in the line. In any case, where work is needed in the field on the pipeline system, the Pipeline crews do it.

Other routine inspections are checking all block valves and others twice a year. If a valve is equipped with an operator and control system for automatic operation, it is checked once a month. River crossings —both overhead and submarine—get frequent checks and maintenance. During wet seasons they are watched very closely. Banks at river crossings receive a lot of attention.

For instance, last spring there was heavy rain in Texas. The Sabine and Trinity rivers were in flood stage. Transco's crossings at these rivers were flown twice a day. When logs and debris started hanging on valves, the Pipeline crews were called out to clear them. Just one of the trouble spots these people have to handle year in and year out.

The Pipeline department is a service force. It works closely with the corrosion prevention technicians, communications engineers, and compressor station personnel. It might install anodes for cathodic protection; maintain a microwave tower; and fill in with needed extra personnel for major compressor station overhauls.

Transco's Pipeline people make their own hot taps. They will work against pressure up to 500 psig.

Transco's pipeline is designed for 800 psig operating pressure. All piping in the system has been hydrostatically tested in accordance with the Code, and the pipe is coated and wrapped. The entire system is under cathodic protection.

The system is made up of:

665.19 miles of 36-in. OD pipe
1940.37 miles of 30-in. OD pipe
1331.81 miles of 26-in. OD and under pipe.

There is a pipe rack at each compressor station with not less than 1000 ft of each size of pipe installed in that section of the mainline.

It is a big system for Pipeline to take care of, but they are out in all types of weather doing just that. Certainly these men play an important role in keeping natural gas flowing to Gotham.

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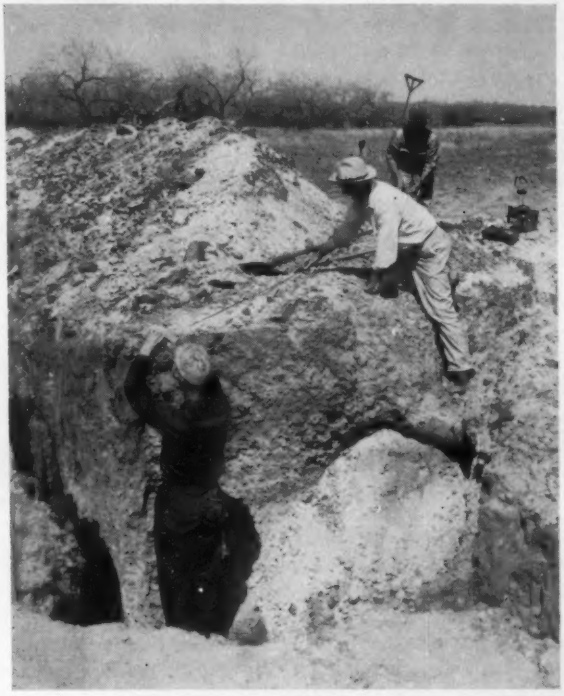
Crew from pipeline district 5 clears right-of-way road near Alexander City, Ala.

# Transco's pipeline department at work

Pipeline crewmen unload bottles from truck after returning from welding job along the route of the mainline.

District I crewman perform maintenance work on the Transco line on the King Ranch property in Texas.



Maintenance crew from El Campo, Texas sandbags Transco's crossing of the Colorado river in Texas.

# Compressor stations department

Aerial view of Station 3 (reciprocating) near El Campo, Texas.

THE muscle of any natural gas pipeline is its compressor stations. On Transco's system the muscle is big and healthy. It has to be to keep powering a pipeline that runs at or near 100 per cent load factor for 24 hours a day, every day in the year.

At present, it takes 354,660 installed horsepower to move the gas in the Transcontinental system. This power is broken down into 23 mainline stations, ranging from 6000 to 20,330 hp each. Some 550 Transco employees operate and maintain these facilities.

Compressor Stations department operates conventional reciprocating engine-compressor units; reciprocating-engine driven centrifugal units; an electric-motor driven centrifugal compressor; and steam-turbine driven centrifugal compressors. There are eight reciprocating field compressor stations that boost field pressure of gas coming into the mainline system.

A reciprocating station on Transco's system that generates its own power will be manned by 26 men. If commerical power is used, 21 men are needed for a reciprocating station. A steam-turbine centrifugal station requires the same size crew. The engine-driven centrifugal has a force of 21 men. All stations must have technicians on duty day and night to assure efficient operation.

Since the high load factor remains virtually the same during the summer and winter on Transcontinental Gas Pipe Line Corp.'s system, outages at the compressor stations that result in loss of horsepower are particularly serious. Compressor Stations' approach is to keep them all running with a very mini-

## Transco's Mainline Compressor Stations

| Sta. No. | Present | | Proposed | | Total | | Type Engines | | Mfr. |
|---|---|---|---|---|---|---|---|---|---|
| | No. Engines | Inst. H. P. | No. Engines | H. P. | No. Engines | H. P. | Present | Proposed | |
| 2 | 5 | 8,320 | — | — | 5 | 8,320 | BA & HBA8's | — | Clark |
| 3 | 5 | 12,000 | 1 | 2,500 | 6 | 14,500 | GMW10 | GMWA10 | Cooper |
| 23 | 4 | 14,460 | — | — | 4 | 14,460 | FSE16 | FSE16 | Nordberg |
| 4 | 6 | 14,400 | — | — | 6 | 14,400 | GMW10 | — | Cooper |
| 24 | 7 | 17,500 | — | — | 7 | 17,500 | GMWA10 | — | Cooper |
| 5 | 3 | 13,040 | — | — | 6 | 19,040 | Steam | — | Ing. Rand Clark Comp. |
| 49 | 3 | 6,000 | (49 will be tied in with Sta. 5) | | | | TLA6 | — | Clark |
| 51 | 3 | 6,000 | — | — | 3 | 6,000 | TLA6 | — | Clark |
| 6 | 8 | 19,300 | 1 | 2,500 | 9 | 21,800 | GMW10 & GMWA10 | GMWA10 | Cooper |
| 7 | 4 | 19,830 | — | — | 4 | 19,830 | Steam | — | De Laval |
| 8 | 8 | 19,300 | 1 | 2,500 | 9 | 21,800 | GMW10 & GMWA10 | GMWA10 | Cooper |
| 9 | 7 | 16,800 | 2 | 5,000 | 9 | 21,800 | GMW10 | GMWA10 | Cooper |
| 10 | 4 | 20,330 | — | — | 4 | 20,330 | Steam | — | Clark |
| 11 | 7 | 16,800 | 2 | 5,000 | 9 | 21,800 | GMW10 | GMWA10 | Cooper |
| 12 | 7 | 16,800 | 1 | 2,500 | 8 | 19,300 | GMW10 | GMWA10 | Cooper |
| 13 | 9 | 14,720 | 1 | 2,000 | 10 | 16,720 | BA8 & HBA8 | TLA6 | Clark |
| 14 | 6 | 14,400 | — | — | 6 | 14,400 | GMW10 | — | Cooper |
| 34 | 1 | 12,500 | — | — | 1 | 12,500 | Motor Driven | — | GE-Clark |
| 15 | 8 | 12,960 | — | — | 8 | 12,960 | BA & HBA8's | — | Clark |
| 35 | — | — | 2 | 7,640 | 2 | 7,640 | — | FSE16's | Nordberg |
| 16 | 7 | 11,200 | — | — | 7 | 11,200 | BA8's | — | Clark |
| 36 | 5 | 10,000 | — | — | 5 | 10,000 | TLA6 | — | Clark |
| 17 | 5 | 12,000 | — | — | 5 | 12,000 | GMW10 | — | Cooper |
| 37 | — | — | 2 | 8,800 | 2 | 8,800 | — | LSV16 | Cooper |
| 18 | 7 | 11,200 | — | — | 7 | 11,200 | BA8's | — | Clark |
| 38 | 5 | 10,000 | — | — | 5 | 10,000 | KVS12's | — | Ing. Rand |
| 19 | 7 | 11,200 | — | — | 7 | 11,200 | BA8's | — | Clark |
| 39 | — | — | 2 | 7,640 | 2 | 7,640 | — | FSE16's | Nordberg |
| 20 | 8 | 13,600 | — | — | 8 | 13,600 | BA8 & TLA6 | — | Clark |

mum of downtime. A preventive maintenance program has been developed to attain this goal.

Another factor is the high degree of skill available to Transco for compressor station personnel. As a policy, the company brings many operating personnel into the established maintenance and overhaul programs. It has been found that this is excellent training and enables even veteran personnel to know their own machinery better.

Most compressor stations are pretty self-sustaining installations. Many provide on-station housing for the families of the station personnel. Each station must have a water supply system for both operating and domestic purposes. Electricity must be supplied, usually from generating equipment in the station. And even if commercial power is available and economic, stand-by generating equipment is on hand in case of power failure. Lubricating or sealing oil supply and cooling systems must be installed at each station. In fact, every piece of equipment and service must be provided and maintained to keep compressor stations operating in good and bad weather, in favorable conditions and in times when the entire area around a particular station is in a state of emergency.

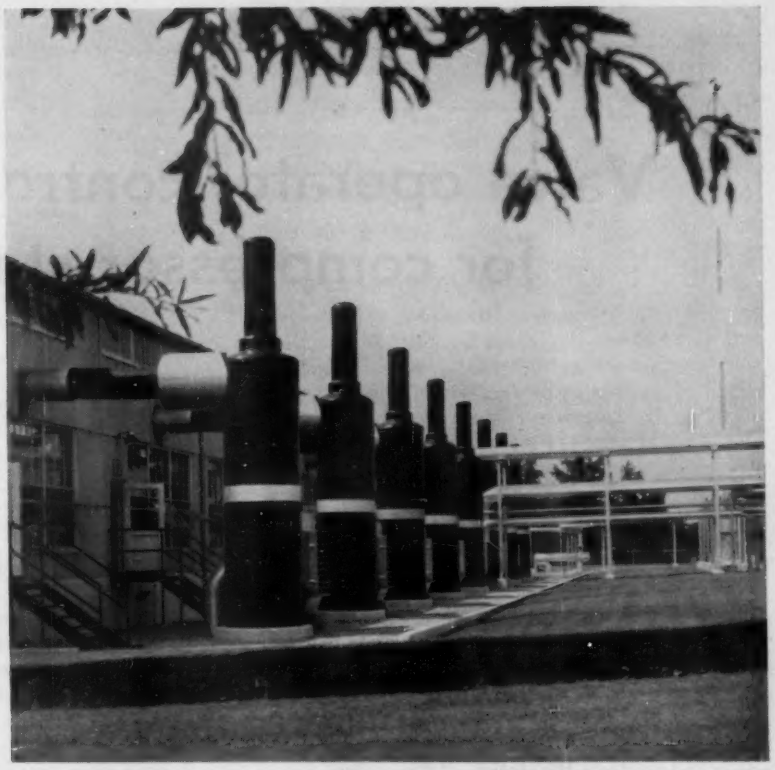
Take the case of a hurricane that blew into the Louisiana coast last year. Soon after the high winds with heavy rains hit, public communications and power supplies were completely out. But Transco's Louisiana compressor stations were still in full operation. The microwave communications system provided dependable communications and the auxiliary generating plants supplied power. Gas continued to flow to Gotham without concern to the consumers. This is the type of security Transco designs into its stations. And such emergencies show how loyal, trained personnel keep a pipeline in business.

Naturally, inspection and maintenance of the prime movers, compressors and auxiliary machinery is an every day affair. Running information is radioed in to the Gas Control department hourly. Such data are, of course, also logged at each station along with other performance data for the station. Individual units can be closely studied at the station from these data.

Periodic preventive maintenance is scheduled for each mainline unit every 35 days. This is essentially a "tune up" in the case of the reciprocator-powered units, with corresponding attention being given to the other types. Careful records are kept and at the end of each 35-day check, an analysis is made of the compressor unit downtime, the causes, etc.

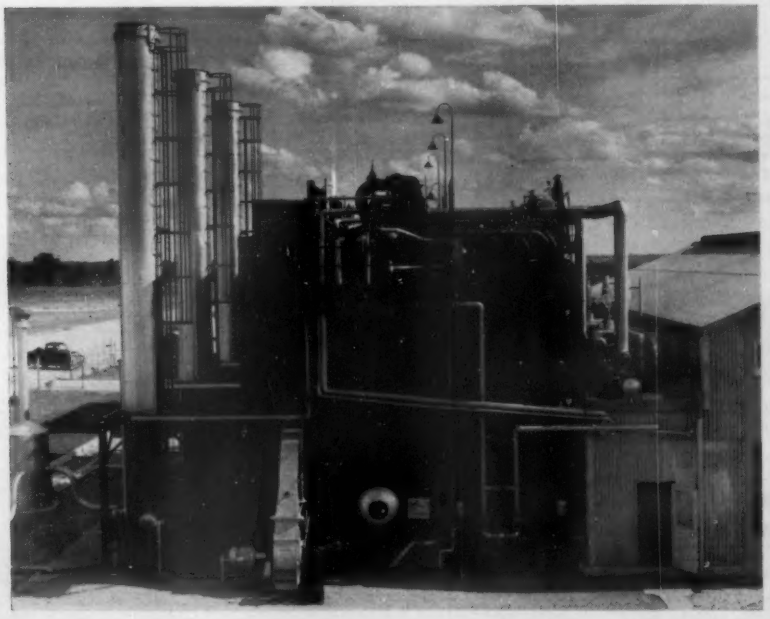
Highlight of Transco's compressor maintenance program is the annual overhaul. This is programmed for the first two weeks in May. In anticipation of it, each Compressor Stations division (there are five) estimates in advance its requirements for bearings, piston rings, and other parts and equipment. These are on hand when the overhaul begins. Personnel are borrowed from other operating departments so that, once started, the program can proceed at top speed.

Each station drops off one unit at a time. Three crews work 8-hr shifts until the overhaul of all units is completed. As mentioned, these programs serve as training schools through practical experience as well as planned maintenance efforts.



Compressor Station 15, located near Charlotte, N. C., pumps gas on its long route to Gotham.

Though the weather outside may be frightful, Transco's compressor stations blaze with light through the night and throb away day and night moving to New York City and other markets. Millions of dollars in structures and equipment have been invested for this purpose. The operators are ever alert for a rough-sounding engine or any condition that may mean trouble at a station. They are confident that they have the experience and know-how to deal with it. Obviously, they have, for Transco has come through the severe 1957-58 winter with its stations on the line. Users of gas for space heating in New York City were not troubled with shortages during the strong cold waves of February that caused some critically short gas supplies in parts of the midwest and southeast. Transco's Compressor Stations department can take a neat portion of the credit for this accomplishment. ■



One of the three steam stations is Station 10, located on Transco's mainline near Clanton, Ala.

# Valve operator control systems for compressor stations

By HOWARD L. LEDEEN, Vice President
Ledeen Manufacturing Co., El Monte, Calif.

VALVE operator control systems or "harnesses" are applied to conventional line valves in gas compressor stations for automatic or remote operation. The "harness" is the control valve arrangement, which accepts a signal or manually applied command and proceeds to direct the pneumatic or fluid power toward the accomplishment of the original command. Perhaps in a more accurate sense, it "harnesses" the fluid power and controls the action of the valve.

There is a wide variety of primary instrumentation that is utilized in the control of various functions within a gas compressor station. This article tries to focus attention to control requirements as they apply to signals directing the opening or closing of specific valves.

The circuit illustrations presented here interpret schematically the plug type valve. The conventional plug valve moves from closed to open position in 90°

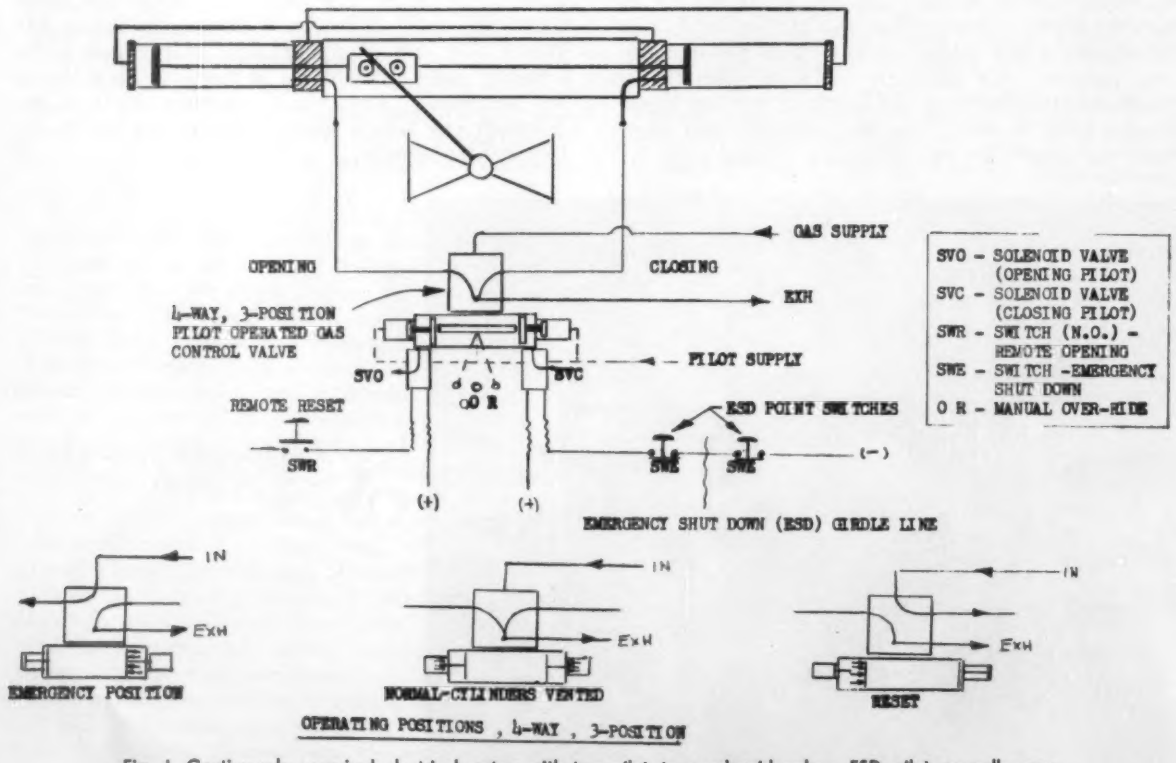



Fig. 1. Continuously energized electrical system with two pilot type solenoid valves ESD pilot normally open and continuously energized to closed position.

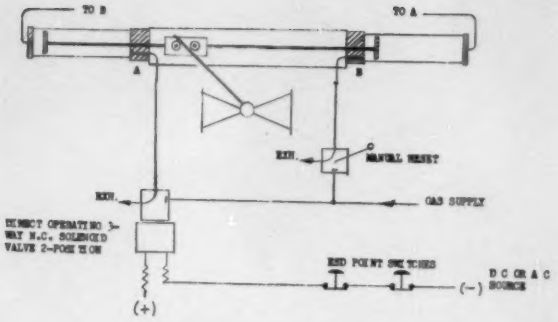



Fig. 2. Continuously energized electrical system utilizing 3-way direct solenoid-operated valve with 3-way, spring return manual reset valve.

of counter clockwise rotation. Most of the circuits which are illustrated may be superimposed on gate type valves with slight modifications.

To operate the valve, it is necessary to have some primary device for torque development. This may be:

1. Gas or electric rotary motor driving through a mechanical transmission and converting low torque at high speed to high torque at low speed.
2. Gas or electric rotary motor driving a hydraulic pump, which in turn directs high pressure hydraulic fluid to cylinders or vanes.
3. Vane or "swept volume" type operator, which directly applies gas or hydraulic fluid under pressure to a rectangular "rotor" area.
4. Positive displacement cylinder type operators.

The illustrations which follow describe the positive displacement cylinder type actuator. This simple mechanism allows for easy interpretation of the valve movements. The control systems or harnesses may be applied to other types of operators; however, regardless of how the torque is applied to the valve stem, the control problems remain essentially the same.

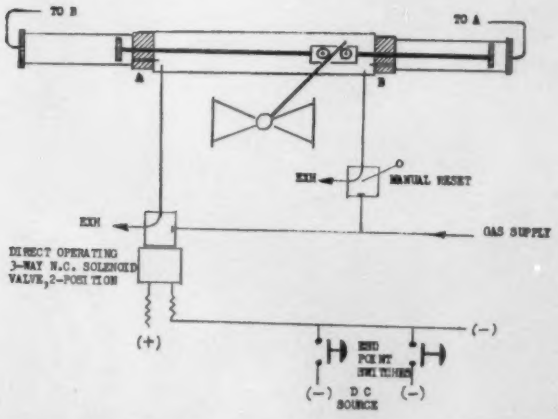



Fig. 4. De-energized electrical system. Closing any single ESD point switch energizes 3-way normally closed solenoid valve.

Control systems are used mainly for:

1. Emergency shutdown valves.
2. Compressor unit valves.
3. Instrument controlled "off-on" units for meter runs, high-low protection, and various remote convenience type operators.
4. Modulating valve action.

## • Emergency shutdown controls

The emergency shutdown systems are all designed to comply with the general conditions set forth by the Gas Transmission and Distribution Piping Systems Code of the ASA. The methods of complying with the terms of this code are many and varied. In general, however, the fundamental problem is one of "blocking" gas from the station and then venting all station piping. The emergency shutdown system has, as its objective, the isolation and shutdown of a compressor station in the event of fire, explosion, or some such disaster. Sometimes the system is made to encompass abnormal operating conditions such as "over-pressure," high temperature, etc. The isolation of the station is accomplished by closing the station side valves, one on the suction and one on the discharge, and then venting the gas retained by the station piping. This action is generally followed by opening the station by-pass valve, thus continuing the flow of gas down the mainline.

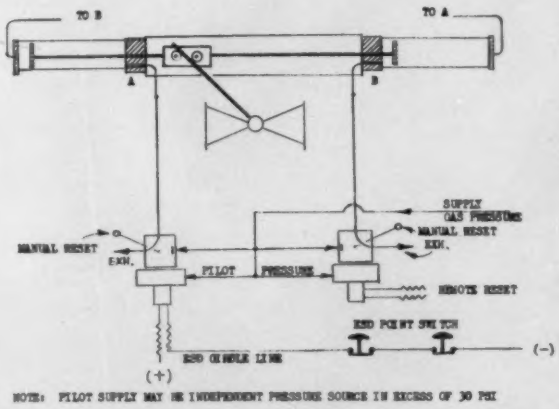



Fig. 3. Continuously energized electrical system utilizing 3-way valves with solenoid pilot operation and manual or remote reset.

There are widely varying concepts as to what types of control systems should be employed in accomplishing an emergency shutdown. The following basic system variations can be classified.

A. Fully energized electrical system.

B. De-energized electrical system.

C. Pressurized high pressure gas for direct operation of actuators.

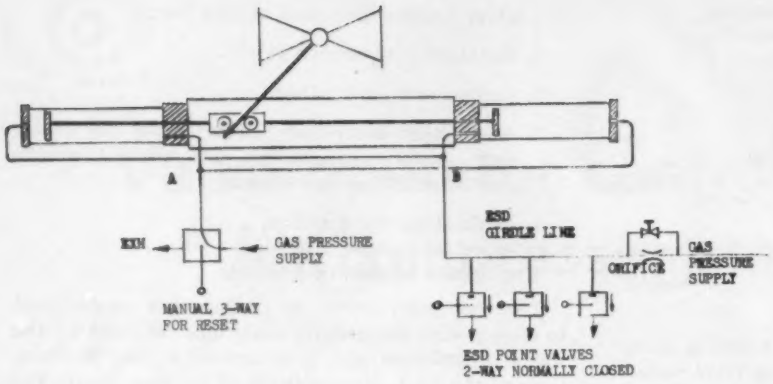



Fig. 5. Pressurized high pressure gas system for direct operation. Opening any single ESD point switch energizes 3-way normally closed solenoid valve.

D. Pressurized high pressure pilot system.

E. De-pressurized system.

*Figs. 1 through 11* schematically illustrate these systems.

The schematic arrangements illustrated embody a technique normally resorted to on most all emergency shutdown systems; that is the use of a so-called "girdle" line—a continuous line either pressurized or de-pressurized. In the case of electrical circuits a continuous conductor is provided which meanders through the plant connecting in series with the control points at each of the valve actuators. In the case of pressurized pneumatic or energized electrical system, anything that breaks the continuity of this "girdle" line will function the emergency shutdown. The inverse action takes place on de-pressurized and de-energized systems.

*Fig. 1* illustrates a schematic arrangement of an electrically energized system. The electrical system on this shutdown is tied into the compressor engines by means of relay action, which, when de-energized, grounds the magnetos thereby cutting off the ignition source for the engine.

Again in *Fig. 1*, a normally open solenoid operated pilot valve is maintained in the continuously energized condition, thus keeping the closing pilot chamber vented. A break in the electrical continuity causes the pilot valve to move to its normally open position, thus admitting pneumatic pressure to the opening pilot and shifting the valve for emergency function. The electrical type "girdle" line may, of course, be run to all points in the station with as many emergency shutdown points as are required. The interruption at any one point of the circuit will trigger the entire system.

In electrically operated systems, it is possible to use directly operated large-capacity 3-way solenoid controlled valves as illustrated in *Fig. 2*. The power consumption of the electrical circuit becomes an important factor in considering this type of arrangement. Heat dissipation, economics of higher capacity electrical circuitry and the normal problems of holding the seat in an a-c continuously energized valve favors the selection of small, pilot type, solenoid energized valves. These small pilot valves normally have a wide range of orifice sizes for various pressure ratings. In addition, the power consumption on holding coils is generally in the order of 10 watts each.

In a large station with 20 or more valves on emer-

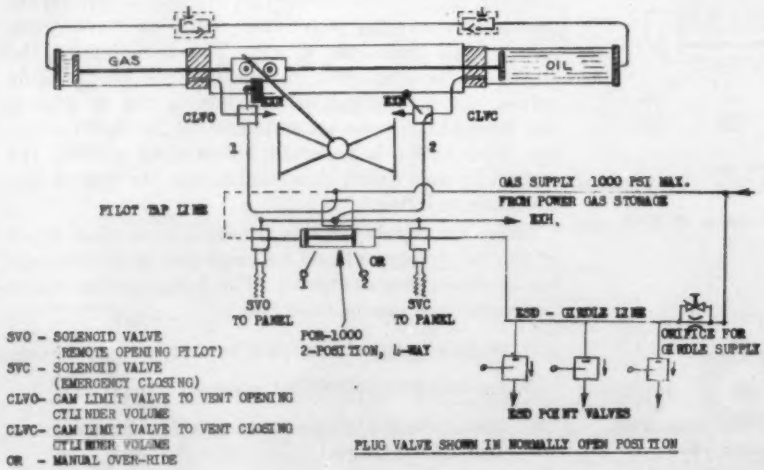



Fig. 6. Pressurized (high pressure) "girdle" line. Pilot controlled 4-way, 2-position valve, with remote solenoid control for reset, and cam limit valves for end of stroke depressurizing. Unit shown with hydraulic speed control.

## Pipe prefabrication simplifies construction problem

Located at a scenic and rugged mountainous section of West Virginia, the Sweeney Compressor Station presented many construction problems for Hope Natural Gas Company's engineers.

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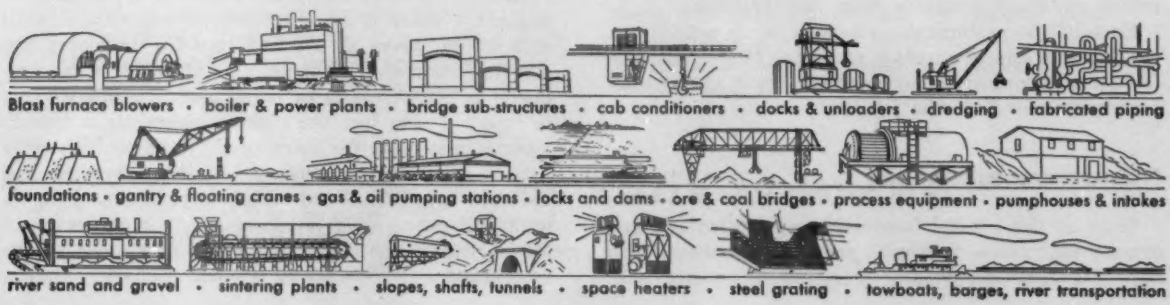
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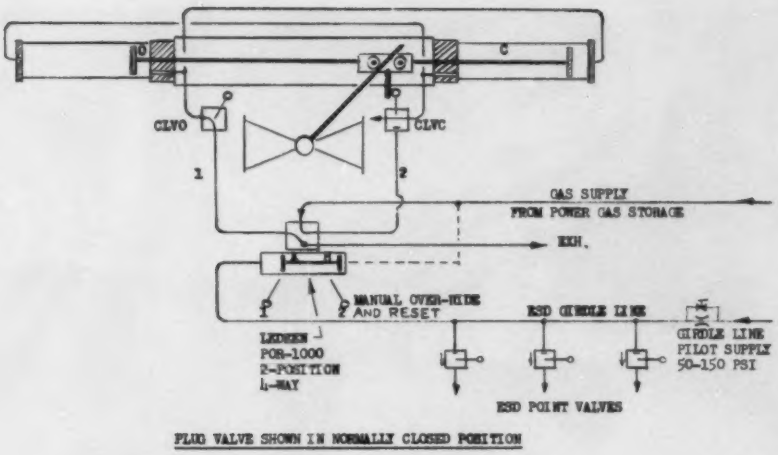



Fig. 7. Pressurized (low pressure) "girdle" line. Pilot controlled 4-way, 2-position valve with cam limit valves for end of stroke depressurizing.

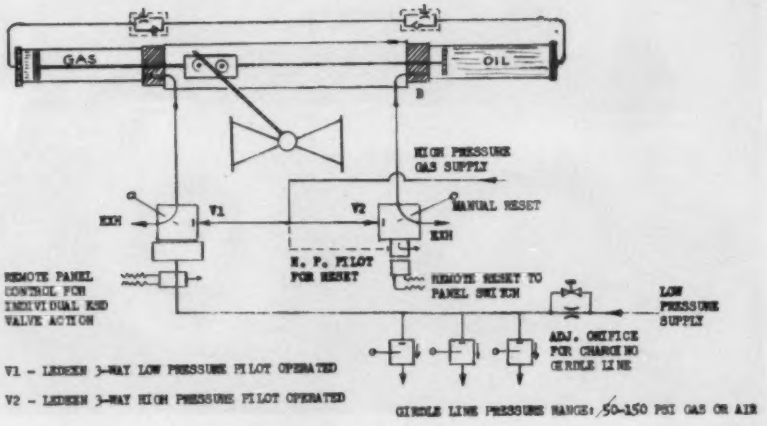



Fig. 8. Low pressure "girdle" line operating two 3-way pilot controlled valves with manual or remote reset. Unit shown with hydraulic speed control.

gency shutdown, every watt of power is multiplied by the number of valves. Holding the circuit loading to a minimum would be desirable in this case.

The inverse to the pressurized pneumatic system is, of course, the non-pressurized arrangement, that also uses the girdle line which is only pressurized by the signal valves at the time of emergency. The non-pressurized system can be either of high pressure or low pressure type. The control circuitry at the valve actuator remains basically the same. The non-pressurized system has its electrical parallel in *Fig. 4*. In this de-energized electrical arrangement, the closure of any of the emergency shutdown points completes the circuit, energizing all of the pilot valves. This form normally requires a reliable d-c source of emergency power, generally available from battery banks.

Each of the systems described so far is actually in use in some gas compressor stations. It still appears to be a matter of experience and judgment as to which arrangement will do the job best.

## • Compressor unit valves

Some of the control harnesses are applied to compressor unit valves to permit remote compressor loading. The four important compressor valves are unit suction, unit discharge, unit by-pass, and unit vent. In the majority of compressor stations, these four valves are manually operated. Automating the sequence of operations to start and load an engine is a complicated task.

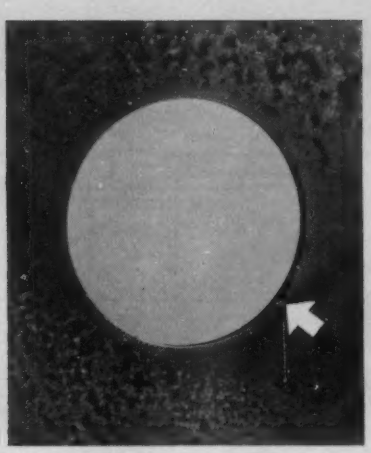
Normally there are four basic control circuits:

1. The engine starting circuit.
2. The valve positioning circuit.
3. The alarm circuit.
4. The shutdown circuit.

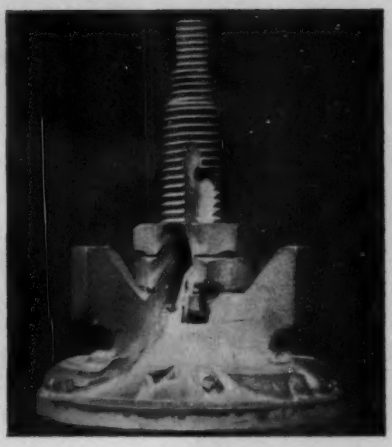
The following comments will be confined to the valve positioning circuits.

Most compressor valves are manually operated. Consequently, there is a background of experience available which serves as a foundation for designing the remotely controlled systems. One of the first requirements is the necessity of being able to crack a valve or "jog" it into just the right position. In a typical loading operation, the starting air is applied, there is a time delay for purging, the ignition goes on, and the fuel valve is opened to idling pressure. Finally, with the engine under rpm control, it is necessary to begin opening the discharge valve. This valve has to be cracked slowly to about ¼-open. Generally this is

**Pressure control lost** with this dust-eroded regulator valve part



**Edge nicked and rounded** on this flat plate orifice—caused by dirty gas



**Sand-blast erosion** by pipe line dust ruins this inner valve

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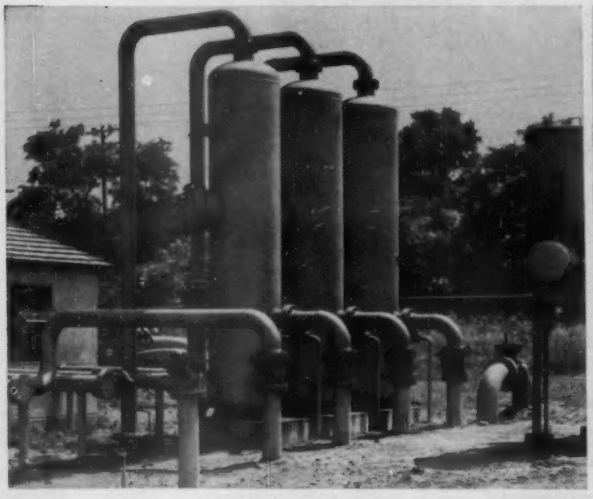

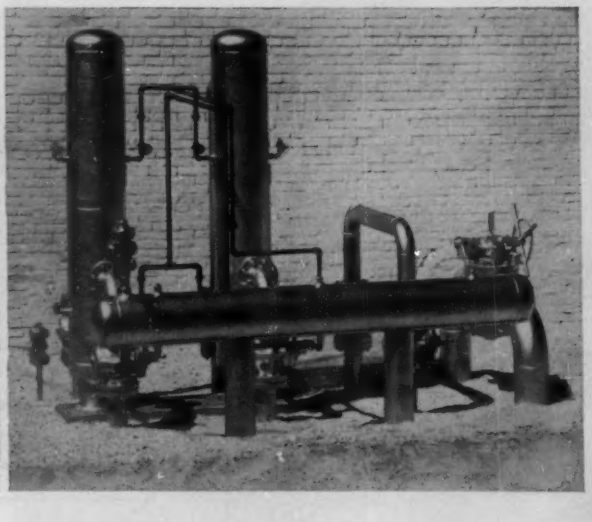

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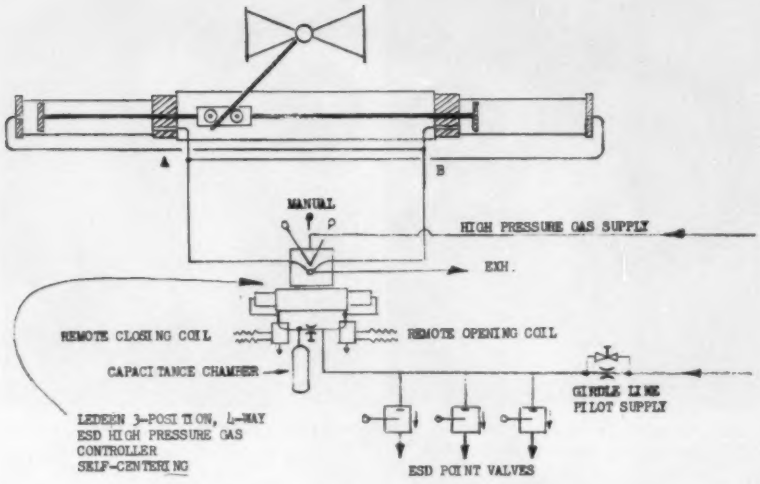



Fig. 9. Pressurized pilot system with remote electrical convenience operation of individual valves.

a two-man operation, requiring one man on the valve and the other man at the engine, and by a combination of sensing the sound of the gas through the line and feel of the loading operation, the valve is cracked open to the right position.

The same thing is generally true of the unit suction and by-pass valves. This means that the first step in automatic control would be to simulate the action of an existing manual operation. This is done by providing a valve control mechanism, which makes it possible for an operator at a control "console" (close to the engine) to remotely position the valves by jogging them into their correct position. This makes it possible for one man to control the valve operation.

The requirements that are imposed upon the control system, however, make it necessary to be able to move a valve under closely regulated speed control conditions. This imposes the requirement of independent speed control for opening and closing, and makes it necessary to be able to find any intermediate position between open and close.

*Fig. 13* illustrates a basic engine control circuit. It will be observed in this circuit that the fundamental actuator power comes from the stored pneumatic gas energy, but the speed control and dampening action is achieved by means of the closed hydraulic circuit. Speed of action can be carefully adjusted by opening or closing the speed control valves. A three-position 4-way gas control valve is pilot operated by the remote instrumentation, and in the neutral position provides a very sharp cut-off point for actuator positioning.

*Fig. 14* illustrates a typical unit valve actuator complete with necessary electrical pilot controls.

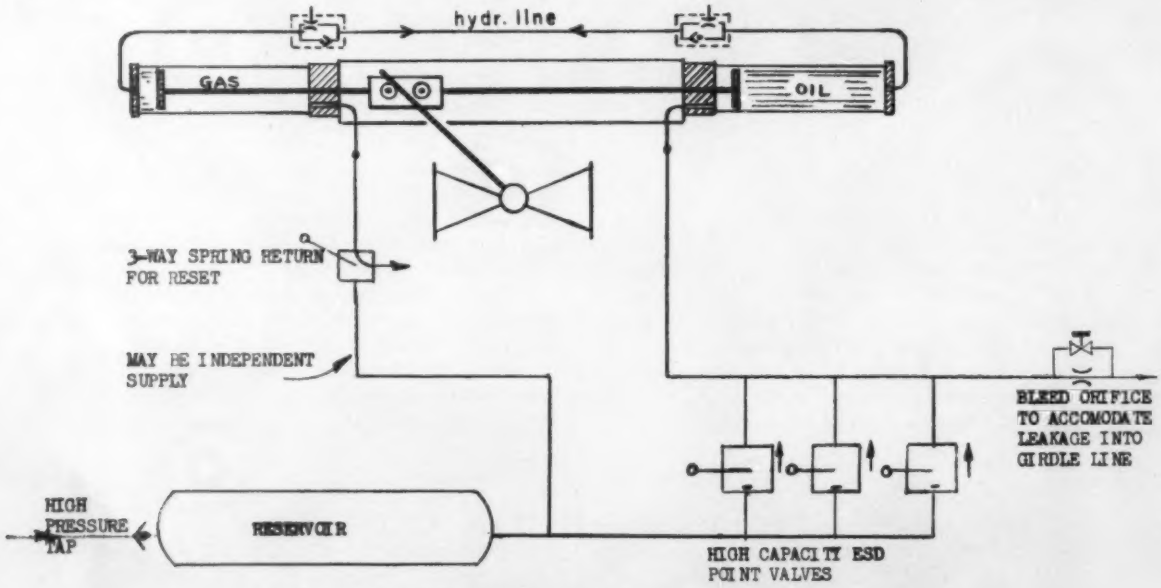
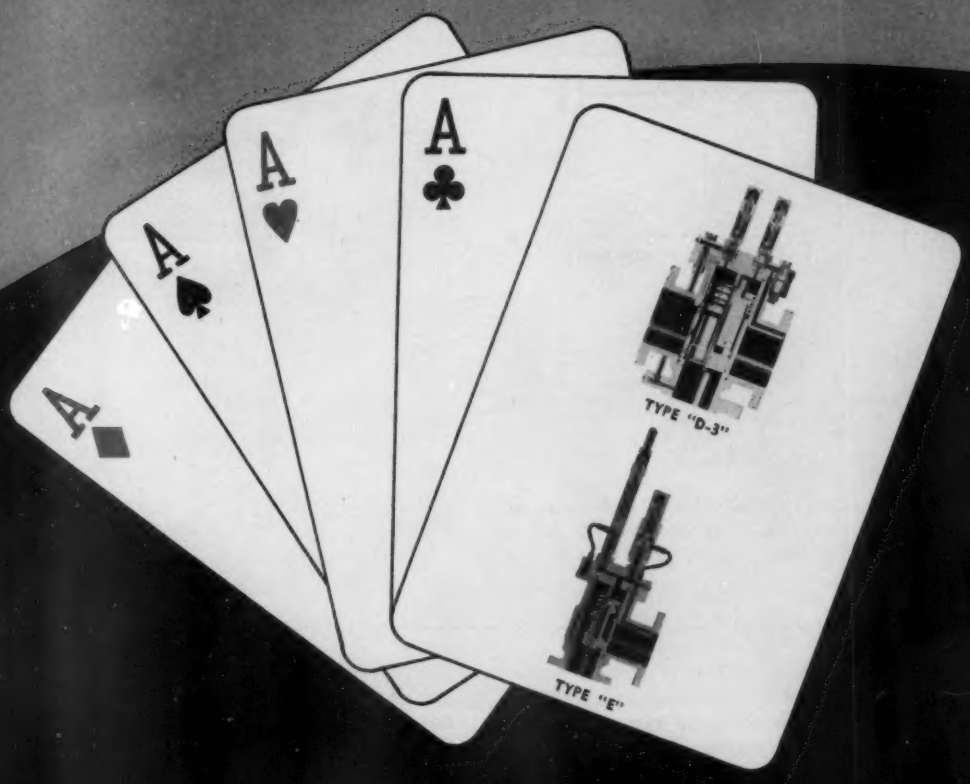



Fig. 10 De-pressurized (high pressure) "girdle" line, direct operating with manual reset.

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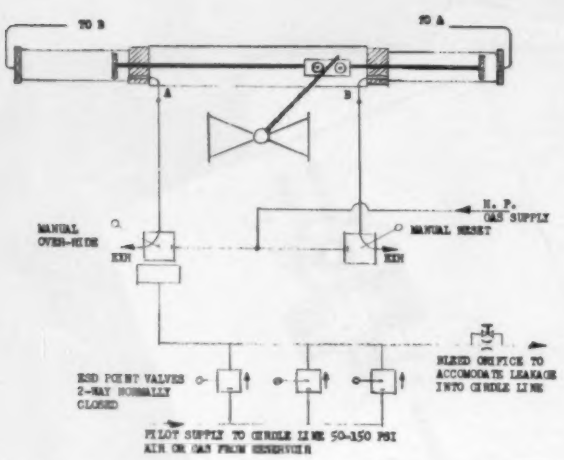


Fig. 11 (above). De-pressurized system with high or low pressure "girdle" line. Fig. 12 (right). Emergency shutdown gas control harness illustrating 4-way 3-position power operated valve.

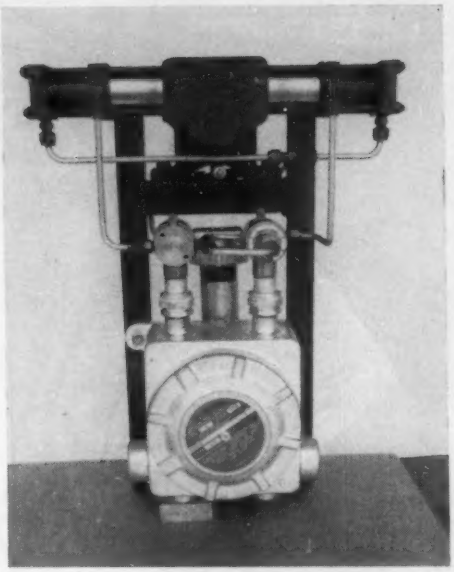

*Fig. 15* illustrates a similar system with an all pneumatic control action.

Once having provided an adequate remote control system, the next step is to compose an automatic sequence action. This requires setting up adjustable programming valves which trigger the sequential movement of additional unit valves. With proper sequencing action, it is possible to load an engine-driven compressor by simply pushing one button. The following valve movements will then take place automatically. The compressor discharge valve will begin to open very slowly; when it reaches a position of about ¼-open, a programming or sequence valve signals the vent valve to close; the vent valve in turn at

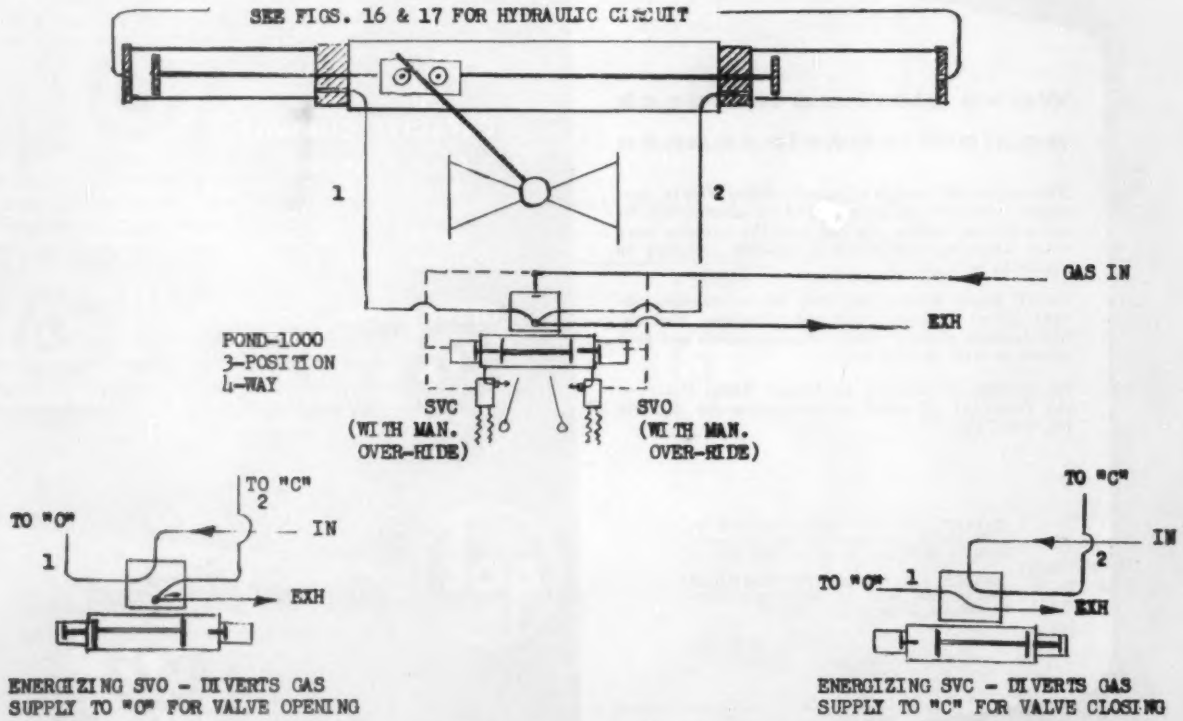


Fig. 13, Schematic of compressor unit valve operator. The 4-way 3-position valve is electrically signalled and features self-centering action for power gas venting.

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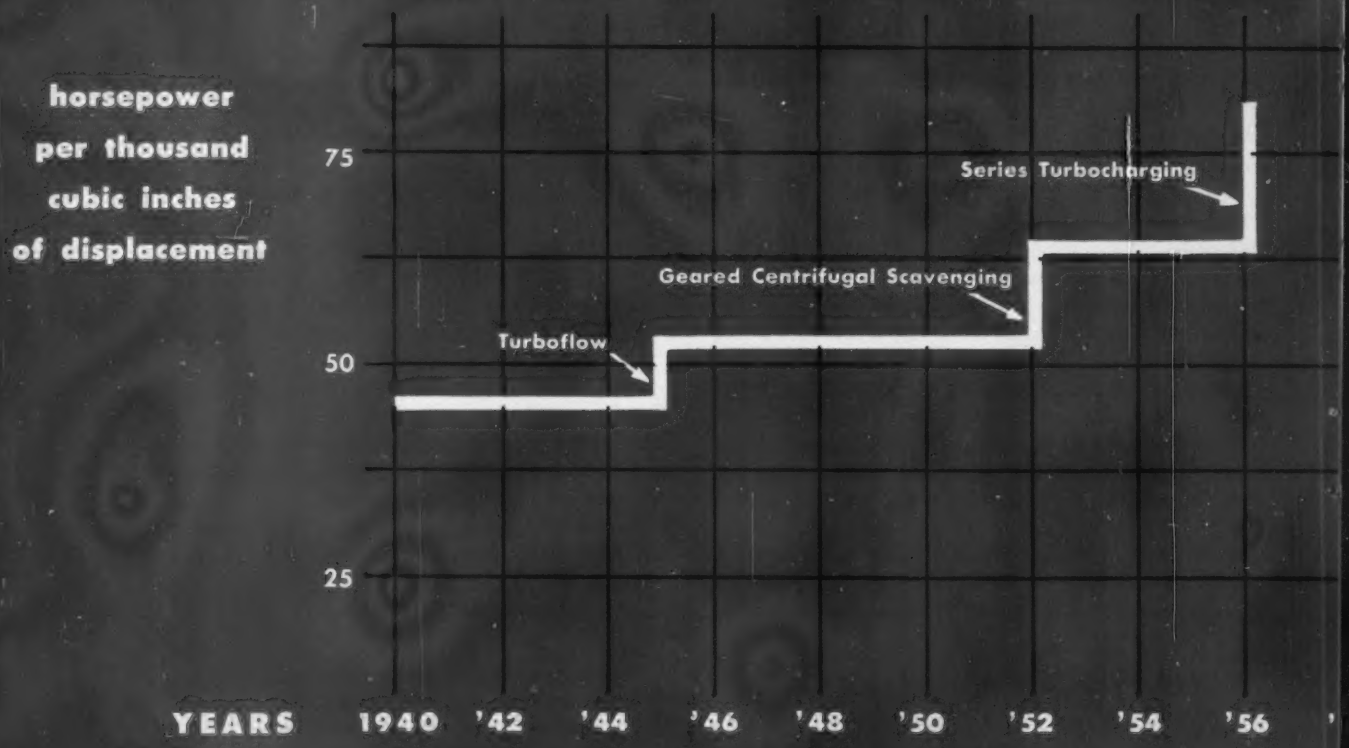

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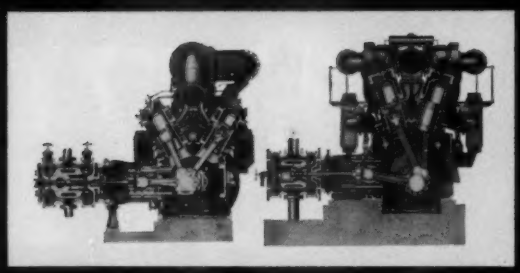

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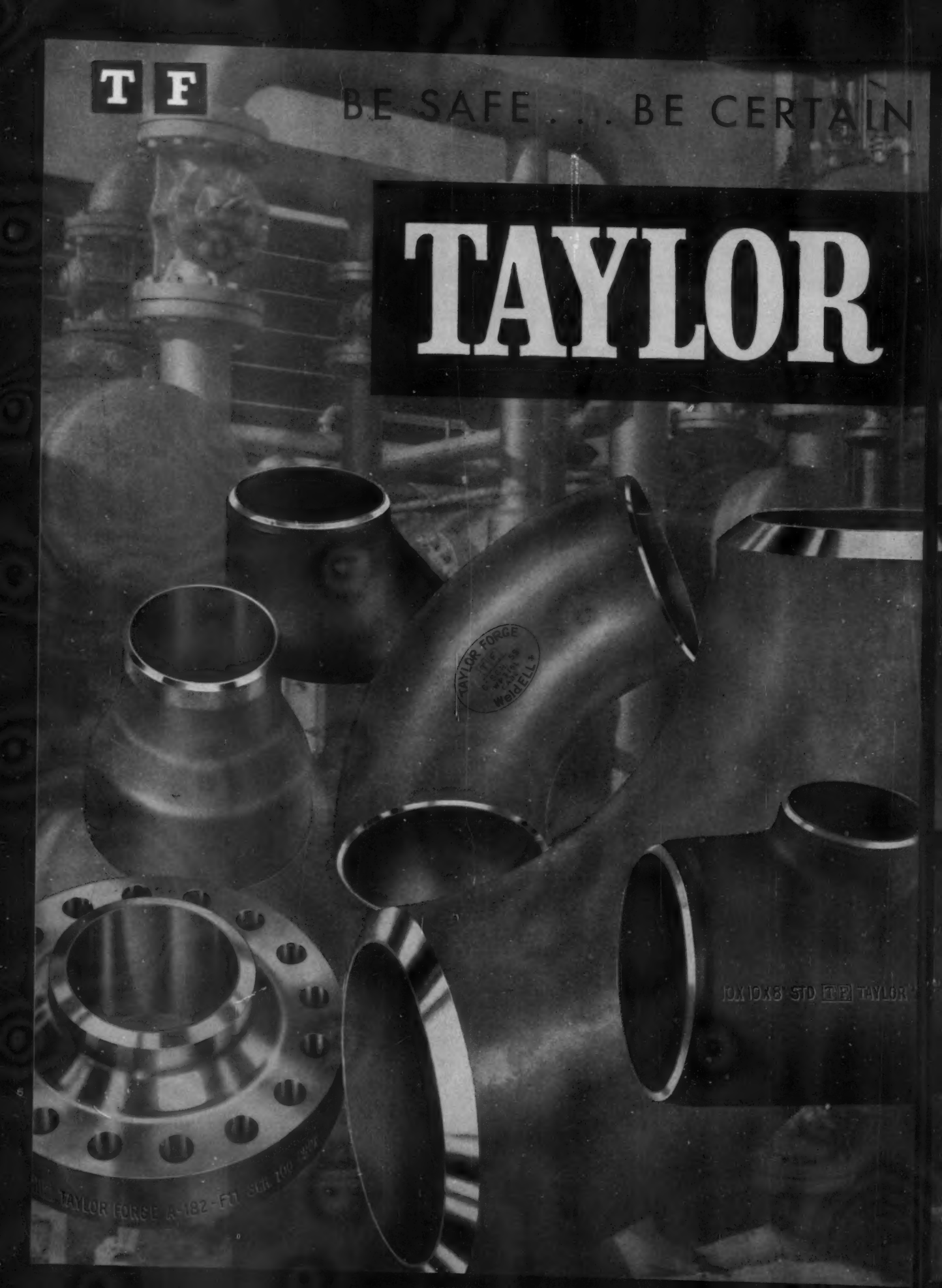
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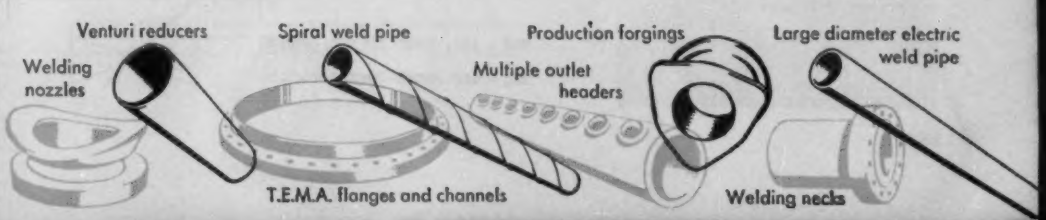

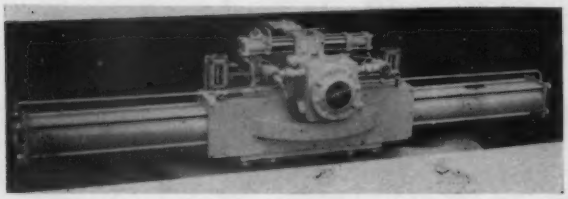

Fig. 14. 4TR 12 electrically signalled compressor discharge valve operator for mounting to 12-in. plug valve.

the end of its stroke signals the suction valve to commence opening; the suction valve as it moves to the open position sequences the by-pass valve to close. The programming valves can, of course, be adjusted so that any intermediate action of the four primary valves can be obtained. By proper setting of the adjustable speed controls for opening and closing, a great variety of control actions can be achieved.

The automatic loading normally requires the provision that the operator can take over and manually

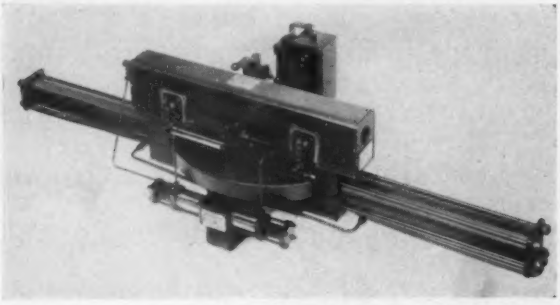

Fig. 15. 3TR 12 pneumatically signalled compressor by-pass valve operator.

control the action of the valves at any time. This is accomplished by means of an overriding manual control circuit. In *Fig. 15* the pneumatic control system is illustrated. It is possible to operate any of the control valves by manual manipulation of the 4-way valve at the actuator, or by manual operation of the hand pump.

*Figs. 16 and 17* illustrate the hydraulic operation of these engine control valves. On the smaller valves the hand pump is eliminated, since these units can be operated manually by means of lever extensions. The hand pump circuit is provided with a diverter valve, which permits tying the discharge pressure of a small hand pump into the appropriate cylinder port and at the same time opening the opposite cylinder port to the return line and to the tank.

On the engine valve controls illustrated above, the circuitry is such that the operator is normally in a de-pressurized condition.

- **Instrument controlled "off-on" units**

Pneumatic signalling lends itself well to use with existing instrumentation. Most pneumatic instruments develop signal pressures of exceedingly low level, ranging from 0 to 15 psig or 15 to 30 psig. Considering the low pressure level of the pneumatic signals and the fact that we are trying to "harness" gas pressure up to 950 psig, it means that the control devices become "high gain" relay mechanisms. This means that we must take a low pressure signal of say 20 psig and operate 3-way or 4-way control valves thus directing 950 psig pressure to the appropriate piston areas.

Pneumatic control systems lend themselves very well to other types of station applications, such as instrument control "off-on" operation for meter run units, "high-low" pressure protection, and various remote convenience type operations.

*Fig. 18* illustrates a typical pneumatically signalled control device. This operator is for field mounting to a 4-in. plug valve. Being a gear flanged type valve, the operator can be completely enclosed. *Fig. 19* is a photograph illustrating this unit ready for valve mounting.

The unit illustrated is designed to accept a single signal, in this case a 20-psig signal from a controller. The signal is imposed upon a special valve, designated as BSR, and is directed to the valve in a snap acting manner. This means that the valve operating mechanism has either zero psig signal or 20 psig. The zero signal would be equivalent to a signal to close the valve, and the 20 psig would be equivalent to a signal to open the valve. The signal receiving mechanism is designed around a device known as a Bellofram, which is a combination bellows and diaphragm. It has good linear characteristics and a minimum hysteresis providing large effective pressure areas with good stroking characteristics. The unit illustrated has an effective area of approximately 9 sq in. This means that with a 20-psig signal we can develop theoretically 180 lb. Since this is a spring return valve, almost half of that power is lost to the spring. With this large area available, adequate shifting force is de-

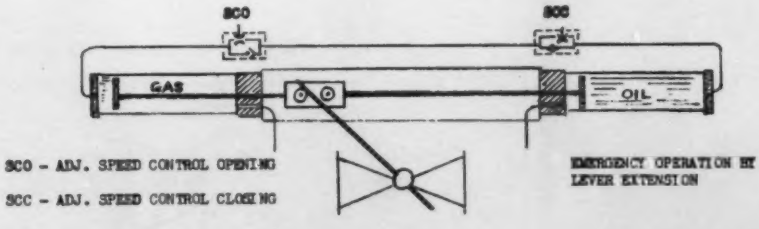


Fig. 16. Hydraulic speed control circuit for compressor unit valves.

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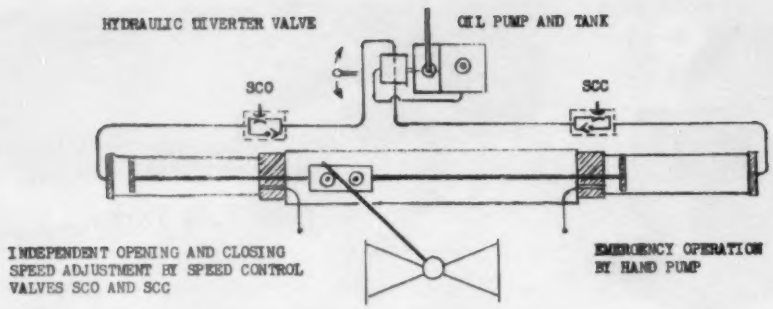
HYDRAULIC DIVERTER VALVE
OIL PUMP AND TANK
SCO
SCC
INDEPENDENT OPENING AND CLOSING SPEED ADJUSTMENT BY SPEED CONTROL VALVES SCO AND SCC
EMERGENCY OPERATION BY HAND PUMP

Fig. 17. Hydraulic speed control and emergency manual hydraulic system with hand pump and diverter valve.

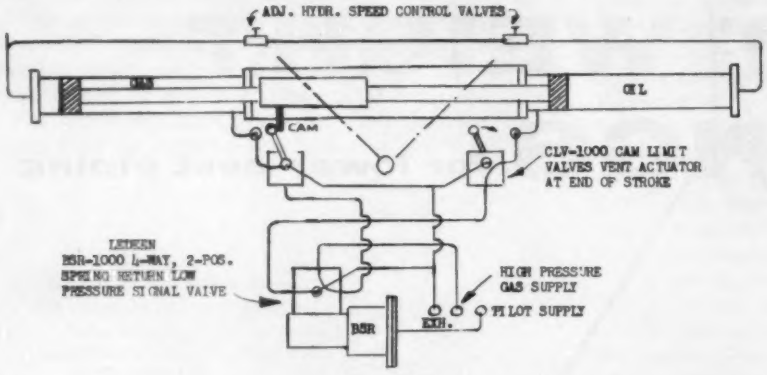
ADJ. HYDR. SPEED CONTROL VALVES
CAM
CLV-1000 CAM LIMIT VALVES VENT ACTUATOR AT END OF STROKE
LEHEEN BSR-1000 4-WAY, 2-POS. SPRING RETURN LOW PRESSURE SIGNAL VALVE
HIGH PRESSURE GAS SUPPLY
PILOT SUPPLY
EXH.
BSR

Fig. 18. "On-off" controller signalled operator for meter run valves.

livered to the 4-way valve. The 4-way valve in turn can direct the high pressure supply to either the opening or closing side of the operator.

Note the presence of cam limit valves in *Fig. 18*. These provide a means of automatically venting the cylinder operator at the end of the stroke. This is particularly advantageous on pneumatic systems where the signal is left on the control as long as the valve is to be held in one position. Since these periods can be quite prolonged, it is desirable to unload the operator taking the pressure off of the packings and parts. Relieving the operator of gas pressure is a step toward minimizing maintenance and leakage problems.

A similar system could be arranged with two Bellofram chambers on a 4-way valve, one signal to open the valve and the other signal to close the valve. This arrangement would lend itself well to plus and minus pneumatic signals giving an approach to electrical analog. Such an arrangement makes it possible to devise a pneumatically signalled circuit that will take two positive signals, thus eliminating the necessity of depending upon a spring to return the 4-way valve to its original position.

- **Modulating valve action**

*Fig. 20* illustrates a relatively new application which has its place in compressor stations, but is also being used elsewhere in the gas industry. The schematic diagram shows the circuit control utilizing a plug valve as a regulating valve for controlling pressure and flow. The advantages of being able to use this conventional type plug valve for modulating action seem attractive. First, and perhaps foremost, is economy. Second, the plug valve offers good flow capacity. Third, there are such considerations as noise control and piping simplification.

Here again there is a wide choice of equipment for accomplishing this modulating action on a plug valve. Two items which are always present, however, are the controller and the positioner. The motive power for turning the plug valve can be hydraulic fluid or gas.

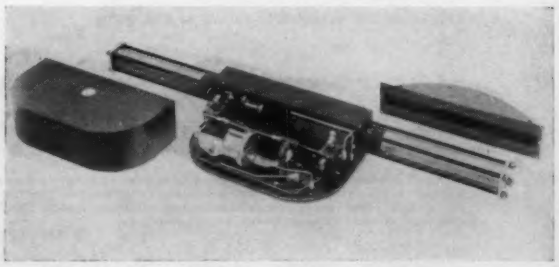

Fig. 19. Instrument controlled "on-off" operator illustrating 4-way low pressure signalled valve and cam-operated limit venting valves.

Great industries are born of great ideas . . .

Natural gas, for example, was once an oddity of nature. Harnessed by the pipeline it has become one of America's key industries.

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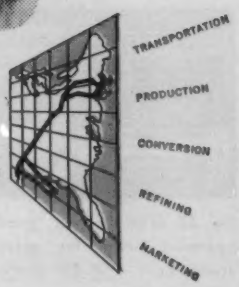


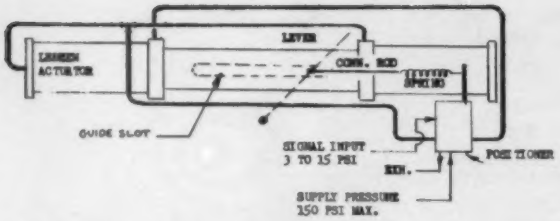



Fig. 20. Circuit arrangement illustrating 3TM 12 with power positioner for accepting proportional controller signal to modulate valve position.

The hydraulic system utilizes an intermediate pump device, which transforms gas pressure to hydraulic pressure with the positioner signal operating directly against the diaphragm of a 4-way valve.

*Fig. 21* illustrates a typical arrangement utilizing a gas-operated hydraulic pump. When the system is under control, the positioner signal reads 9 psig and the 4-way hydraulic valve is in neutral position locking fluid on both sides of the actuator cylinders.

*Fig. 22*, however, illustrates a pneumatic application using a power positioner. A spring is connected directly to the coupling of the actuator and the stroking mechanism of the power positioner. As the actuator moves in its full stroke, the spring is extended and develops a force, which is proportional to the stroke of the actuator. This stroke also is significantly proportional to the angular displacement of the plug valve. The spring force is balanced against a force developed by the bellows within the positioner. It is the bellows which receives the signal from the controller. This pneumatic valve directs 150 psig maximum air pressure or gas pressure to one side or the other of the actuator cylinder, always bleeding proportionally the opposite side of the cylinder. When the actuator arrives at control, the air pressure is locked in both cylinder chambers. Characteristics of this unit appear to be good. However, being a pneumatic device there may be the tendency for the stored pneumatic energy within the cylinder to permit jump beyond the control point. This tendency may be minimized by the introduction of a hydraulic circuit, which maintains very close speed control over the action of the actuator. Further elimination of the jumping action is accomplished by selection of an actuator with sufficiently large torque capacity to overwhelm the nominal torque requirement of the valve.

Fig. 22. 3TM 12 tandem actuator with power positioner.

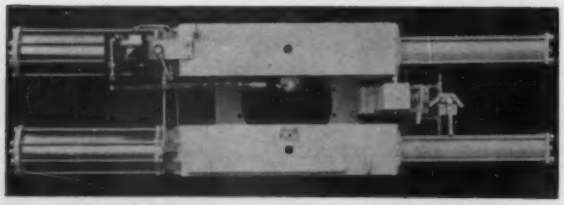
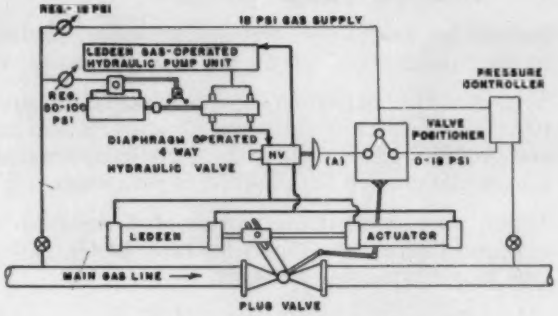


Fig. 23. 6TM 12 open "quad" operator with power positioner and hydraulic circuit for speed control and emergency hydraulic operation.




The Cylinder-Operated Plug Valve is used as a line pressure regulator. The gas-operated, self-starting hydraulic unit supplies hydraulic pressure to the Valve Actuator. At pre-set downstream pressure, the 4-way Hydraulic Valve HV is spring-balanced in neutral position and the Actuator-Operated Plug Valve is at rest. When the downstream pressure varies, pilot pressure in line (A) varies up or down from "neutral" pressure: the valve plunger moves progressively to left or right, admitting oil pressure from pump to one or the other side of the actuating cylinders, thus moving the Plug Valve.

The action of the Controller and Positioner is translated into the slow, smooth motion of an oil cylinder-operated Plug Valve, producing highly satisfactory line pressure regulation.

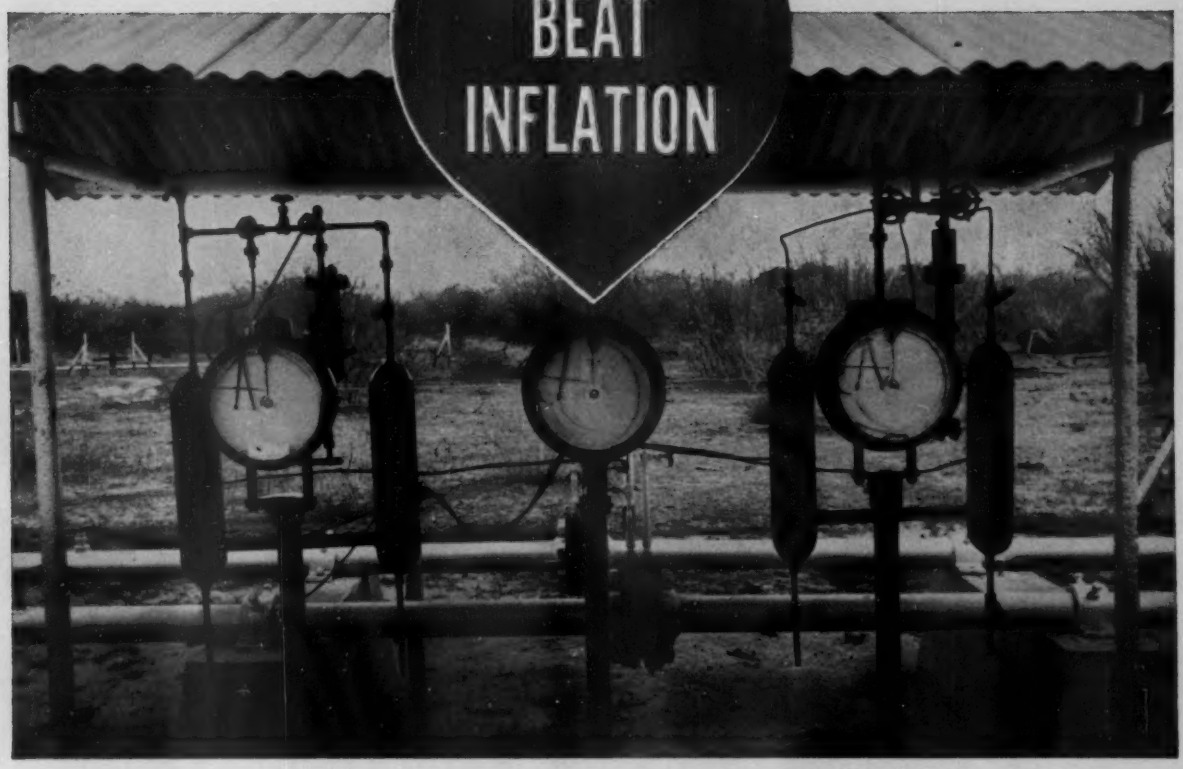
This system has several advantages: (1) Existing valves in service can be economically equipped with available cylinder-operated actuators. (2) In event of failure of the actuating system, the valves remain in operating position instead of fully closing or opening. () Use of hydraulic fluid protects the equipment, reduces maintenance, and improves throttling characteristics. (4) Use of conventional plug valves operated as described above eliminates complicated control stations.

Fig. 21.

All of these systems have a practical bearing on automation of gas compressor stations. The developments which will follow in the near future have already had their previews in such form as a more refined electro-hydraulic operator, better utilization of pneumatic control signals, more accurate positioner controls, introduction of closed loop servo systems, and the whole family of supervisory control actions which must be understood and acted upon by valve operator controls. ■

This article was adapted from a paper presented by the author at the Seventh Annual Instrument Short Course, SCMA, Jan. 30-31, at Wilmington, Calif.

How to BEAT INFLATION



Foxboro high-precision gas metering team in action at Western Natural Gas Company installation in Edinburg, Texas. Foxboro Anti-Ambient Temperature Recorder (right), and Foxboro Gas Flow Meter (left). For over 14 years, Foxboro instruments have been providing "cash register" accuracy for this field.

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*Edited by FRANK CHAPMAN*

# Telecontrol—central or sectionalized?

**By F. VINTON LONG**

CHOICE of telecontrol methods on the medium to long pipelines usually present management with a choice of two types of operation, central or sectionalized control.

Centralized control is usually accomplished from a combined dispatching and operating control center. An example of this is the Platte Pipe Line, with company headquarters, dispatching office, and pump station telecontrol all located in Kansas City.

An example of sectionalized control is that of the Little Big Inch Division of Texas Eastern Products Line, with headquarters and dispatching office at Shreveport, and pump station telecontrol centers at six different points along the pipeline.

Both design philosophies have advantages, and as usual, decision should be made only after careful study of present and projected operational plans.

The deciding factor in many cases is the reliability of the communication system which must transmit the telecontrol intelligence. As a rule, it is simpler to limit the distance between controlling and controlled points because with any type of communication system, the more wire or microwave links between points, the more equipment is involved and the law of failure averages begins to count up.

Therefore, the easiest way to beat this is to sectionalize and have the control points at locations where it is convenient to base maintenance personnel.

However, the easiest is not always the best. Many times it is desirable to use central control and use the most rugged communication links available with the thought that the cost of the beefed up communication system is more than balanced by the saving in operating expenses made possible by use of one combined control and dispatch center.

This is particularly true if long range plans for automatic pipeline operation are considered as when this use of the art of cybernetics takes place, centralized operation is a necessity and communications must at that time be of utmost reliability.

About this time, the question must come to management: "What do we do now? Which way do we go while awaiting the era of the automatic pipeline?" That is not an easy question to answer, but I would be inclined to bite off the problem in little chunks, and start engineering several smaller or sectionalized portions right now with the best communications available and get these sections in operation as soon as possible. Then, from the operating experience obtained in this fashion, I would take the next step, which would be to tie them all together and move my control equipment into one central point.

This does two things. It provides protection from communication failures which might occur on newly installed and lightweight communication systems. And it makes possible the inexpensive transmission of a lot of telecontrol intelligence from the pump or compressor station to the control center concerned.

Then, later, it can be decided just how much intelligence must be handled on a long haul central office control basis.

I believe that in the first few years it is better to transmit too much rather than too little telecontrol intelligence. Part of the cost of at least the first few installations must be charged off to obtaining engineering history, and if this history makes for more efficient operation later, then it is not a cost at all. It is an initial investment for later dividends.

I would like to make clear that with either central or sectionalized techniques there is a certain amount of intelligence that must come back to a central dispatch point, which will later be the home of the automatic pipeline computer. Right now it consists of pressures and temperatures, from which the dispatchers, with a lot of figuring, come up with instructions for operation of each pump or compressor station. This means that there must be a bare minimum of communication facilities from all points on the line to the dispatch center, with provisions for the dispatchers to issue instructions to the stations concerned. With sectionalized control, they issue them to the section control chief, and from there on he takes over.

This minimum of communication means that the section control chief could probably keep his stations on the line even though he has temporarily lost contact with the chief dispatcher. This would be helpful.

Right now this communication is usually carried on, between the dispatcher and the control chiefs, via voice transmission, although other types of service are, in my opinion, better, safer, and more reliable.

Sooner or later the use of voice transmission will be extinct, as it has no place in the techniques of automatic pipline operation. (I would like to make clear that I do not eliminate the decided value of

voice transmission for administration and for emergencies such as line breaks, nor the use of voice communication with mobile repair units.)

Once the line is controlled by several section chiefs, operating on instructions from a central dispatcher, then effort can be spent on the communication beefing up process so that the entire line can be operated from the central dispatcher. And then still later, the telecontrol operation will be carried out by a central computer with the dispatchers providing supervision plus thinking ability for that machine.

Trying to simplify the above, transmittal of all the necessary telemetered information from the many pumping units involved on a pipeline to one central point is a very expensive thing unless privately owned microwave channels are available, and at the start. I would be inclined to look closely at the sectionalized system of telecontrol.

This philosophy is emphasized by the fact that you *must* keep the stations on the line or you are defeating your efficiency effort, and to keep them on the line you must *know* what is going on, and to know what is going on you *must* have sufficient telemetered information to nurse them along. If you don't do that, you are better off by foregoing any attempt at unattended station operation. ■

## GAS • PIPELINE NEWS

### Midwestern and Peoples smoke peace pipe

The peace pact signed by Midwestern Gas Transmission Co. and its competitors in the Chicago-Gary area will culminate in the delivery of 260 MMcf/day to the fuel-hungry area.

Midwestern's plan (Docket G-14695) calls for a $45-million line from Portland, Tenn., to Joliet, Ill. The line would be a 30-incher instead of the originally planned 24-in. size and the capacity was hiked 60 MMcf over the 200 MMcf first planned.

At Joliet, Midwestern's system would connect with the systems of two Peoples Gas Light & Coke Co. subsidiaries, Natural Gas Pipeline Co. of America and Chicago District Pipe Line Co. In turn these companies would make deliveries to Northern Indiana Public Service (100 MMcf/day), Peoples Gas (75 MMcf), Northern Illinois Gas (50 MMcf), Illinois Power Co. (15 MMcf), and North Shore Gas (5 MMcf). An additional 15 MMcf/day would be reserved by Midwestern for future sales.

At the time of Midwestern's new filing, its parent, Tennessee Gas Transmission Co., filed supporting application. It asked authority to install 47,500 additional compressor horsepower on its multiple-pipeline system. The $17.3 million additions will enable TGT to deliver to Midwestern up to 350 MMcf of gas per day at Portland.

This plan apparently brings to an end the two-and-a-half-year old struggle between TGT-Midwestern and competing pipelines over plans to augment the Chicago-Gary area gas supply. (Northern Natural Gas Co. and the American Natural Gas System, intervenors in the original plan, are not parties to the settlement.)

Credit for the settlement was given the work done by the chairman of the Illinois Commerce Commission, at the direction of Illinois' Governor Stratton, to ease the critical gas shortage. The Illinois officials stressed the urgency of getting more gas during the 1958-59 heating season for the area, where 250,000 single-family residences want gas for househeating.

Midwestern said it was willing and could do the job if three conditions were met: (1) it would have to get contracts to sell at least 200 MMcf/day in the area; (2) its proposed customer under the already-pending application, U. S. Steel, would voluntarily agree to buy its gas requirements from Peoples Gas and Northern Indiana Public Service, rather than from Midwestern; and (3) if FPC authorization could be received by April 15.

Peoples Gas participation was conditioned on Midwestern agreeing to no longer oppose the Beatrice project, which includes expansion of Natural Gas Pipeline's system from Texas through the Beatrice, Neb., area. (Uncertainties arising from the Memphis decision caused

Tennessee Gas Transmission common stock became listed for trading on the "big board" at the New York Stock Exchange recently. Listed under the ticker symbol "TGT" were 21,533,303 shares of common stock at $5 par value. There are 18,851,015 shares outstanding. The stock, which had been traded over-the-counter, opened at 26. Pointing out TGT's vast system on the simplified map is President Gardiner Symonds. He is flanked by Robert Stott (left) of Wagner, Stott & Co., specialist in the stock, and G. Keith Funston, president of the New York Stock Exchange.

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postponement of this project last December.) Midwestern agreed to withdraw its opposition if Peoples Gas and the other area distribution companies withdrew their opposition to the pending Midwestern proposal.

Midwestern made it clear that the new alternate proposal doesn't alter or abandon its early application to build a line from Portland to the Canadian border near Emerson, Manitoba, and provide gas to 120 communities in Wisconsin, Minnesota, North Dakota, and Michigan.

## El Paso's major expansion okayed by commission

The FPC met El Paso Natural's March 31 deadline when it okayed delivery of an additional 185 MMcf/day to existing customers in Arizona and California. Cost of the facilities to move the gas is placed at $138.5 million.

The commission acted on two applications by El Paso. But in one it approved only the facilities needed to let the company connect new sources of gas supply. This proceeding was remanded to an FPC examiner. He will have to determine, among other things, El Paso's ability to supply gas for the service proposed in that application.

The first application (Docket G-11797), approved in its entirety by the commission, covers 216 miles of main pipeline, 58,900-hp in compressor capacity, and field facilities. These latter facilities consist of 533 miles of line and 27,850 compressor hp in Arizona, Texas, and New Mexico. The $107.1 million job will supply an additional 75 MMcf/day jointly to Southern California and Southern Counties Gas companies, Los Angeles; and 75 MMcf to Pacific Gas & Electric Co., San Francisco. Some 35 MMcf/day will go to existing customers in Arizona.

The partially approved plan (Docket G-12580) also involves mainline additions. Up to 100 MMcf/day will go to a new customer, Southern California Edison Co., for use in steam electric power plants in the Los Angeles area. Field facilities okayed by the FPC will cost about $31.4 million out of the total estimated project cost of $55.5 million. Included are about 266 miles of line, 8920-hp in compressor capacity, and dehydration, metering and other equipment. Mainline work includes 126 miles of line and additional hp at new and existing stations.

The commission again expressed doubt as to El Paso's ability to meet its system requirements after 1963 and said El Paso should continue its efforts to improve its overall supply position. A more detailed study of system supply and needs will result from the examiner's decision on the application he is studying.

The FPC noted that in an order issued in December, 1956, it had expressed serious concern over El Paso's gas supply. At that time, the commission said it would require in the next El Paso certificate proceeding a definite program demonstrating how the company's future supply requirements were to be met. The commission said it was, therefore, also desirable that the presiding examiner make an appraisal of whether El Paso has met the requirements imposed by the 1956 order.

## TGT seeks more offshore Louisiana gas

More of Louisiana's offshore gas is wanted by Tennessee Gas Transmission Co. Already under construction is the big CATCO project and now TGT wants to install additional gathering facilities at an estimated cost of $2.9 million.

Additional reserves totaling 403 billion cu ft have been contracted with Continental Oil, Newmont Oil, and Magnolia Petroleum. Magnolia is the operator.

Prices begin at 21.4 cents/Mcf and escalate 2 cents very four years.

## CIG challenges Kansas Hugoton order

Colorado Interstate Gas Co. has challenged an order of the Kansas Corporation Commission covering gas taken from the Hugoton field.

On Feb. 1, the KCC said that in setting future allowables for the Kansas sector of the field, consideration will be given pipeline companies' total markets, their other sources of supply in Kansas or other states, and the comparable rates at which they are taking gas in Kansas-Hugoton and other fields.

The commission's order was issued after a two-year investigation of production rates from Kansas, Oklahoma, and Texas wells in the field. The investigation was based on complaints of the Southwest Kansas Royalty Owners Association that Oklahoma wells are being produced at twice the Kansas rate and Texas wells even faster. The commission said drainage of gas from Kansas leases will occur if old production rates continue and will lose to Kansas wells gas they should be allowed to produce.

Colorado Interstate said the commission order was "an arbitrary, unauthorized and unlawful attempt to regulate its interstate operations and its interstate markets," and "a direct interference with the regulatory authority and jurisdiction of the FPC . . . as granted under the Natural Gas Act."

## Recoverable reserves up 8.8 trillion cu ft in '57

With a gain of 8.8 trillion cu ft, proved recoverable natural gas reserves reached 246 trillion cu ft in 1957, thus continuing, traditionally, to top the previous year's figure.

The substantial 8.8 trillion cu ft increase was made while net production during 1957 climbed to an 11.5 trillion cu ft peak. This, too, beats the previous record of 10.9 trillion scored a year earlier.

Additions to natural gas reserves during 1957 totaled 20.3 trillion cu ft. This included 9 trillion cu ft of new discoveries, the best year on record — surpassing the previous high of 7 trillion in 1953. Extensions and revisions of earlier estimates amounted to 11.1 trillion cu ft and an increase of 180 billion cu ft was reported in underground storage.

Estimated proved recoverable reserves have increased from 165.9 trillion to 246.6 trillion cu ft since 1947, a net gain of 80.7 trillion cu ft, or nearly 49 per cent.

During the past 12 years, covering the period the American Gas Association has published reserves statistics, new additions to proved recoverable reserves have exceeded total net production by 97.4 trillion cu ft. Based on current production rates, this gain represents an additional 8½-year supply of natural gas.

According to the joint AGA-API report, new discoveries of natural gas liquids also reached an all-time high in 1957, totaling 128.5 billion bbl.

Canadian natural gas reserves, reported by the Canadian Petro-

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leum Association, climbed to 20.7 trillion cu ft last year, compared with 19 trillion at the end of 1956. Net production of 277 billion cu ft was reported against reserve additions of 2 trillion cu ft.

## Northern Natural plans Illinois invasion

Northern Natural Gas Co. plans to enter the Illinois market for the first time. It is seeking FPC permission to serve Northern Illinois Gas Co. 50 MMcf/day of gas commencing next fall. Northern Illinois also has applied to the Illinois Commerce Commission for authority to proceed with the project.

Northern Natural, at an estimated cost of $8.2 million, will build a line across the Mississippi River at Dubuque, Iowa, to connect with Northern Illinois. Northern Natural's present line extends to Dubuque. Northern Illinois will build a 140-mile line from a point near East Dubuque, Ill., eastward to connect with its present facilities near Des Plaines. Northern Illinois' project will cost about $15 million.

Marvin Chandler, president of the Illinois utility, told stockholders that "we will authorize as many additional **househeating** connections as the new supply, coupled with our other pipeline flow gas, storage and peak shaving facilities, could then handle. Our best guess now is this would permit authorizing between one-third and one-half of our present waiting list of about 115,000 applicants."

Mr. Chandler urged that the Northern Natural deal not be confused with the Midwestern deal. While the Midwestern project "may be completed in time to deliver gas to us in the 1958-59 heating season," he said ". . . there are many uncertainties . . ."

## Leidy-Tamarack capacity tops 105 billion cu ft

If plans to develop the Leidy and Tamarack gas production areas of north-central Pennsylvania are approved by the FPC, the storage area ultimately will have a storage volume of 105.6 billion cu ft of natural gas.

Cooperating in the $25.1 million project are New York State Natural Gas Corp., Pittsburgh; Transcontinental Gas Pipe Line Corp., Houston; and Texas Eastern Transmission Corp., Shreveport. (See *GAS*, April, page 144.)

New York State will have a 50 per cent interest in the undertaking and will construct and operate the facilities for the benefit of all three partners.

The area to be developed is comprised of 14,100 acres. About 13,000 acres lie in what is known as the Leidy gas field and the remainder in Tamarack gas field. For some time New York Natural has been leasing the necessary acreage. More than half of the area is in state forest lands and was leased a year ago.

Of the 105.6 billion cu ft ultimate capacity, about 45 billion will be cushion gas. The 60 billion cu ft of top gas would be available for the three companies to serve their markets.

The request now pending FPC approval calls for developing and using only Transco's 15 million cu ft of top gas. New York Natural and Texas Eastern haven't requested their shares but will do so when their market requirements dictate.

When FPC approval is granted, New York Natural will do the work needed to provide Transco's share of cushion and top gas. The work includes construction of a compressor station, laying gathering lines, reconditioning former producing wells, redrilling abandoned wells, and plugging wells not considered suitable for storage operations.

## Southern Natural plans largest single expansion

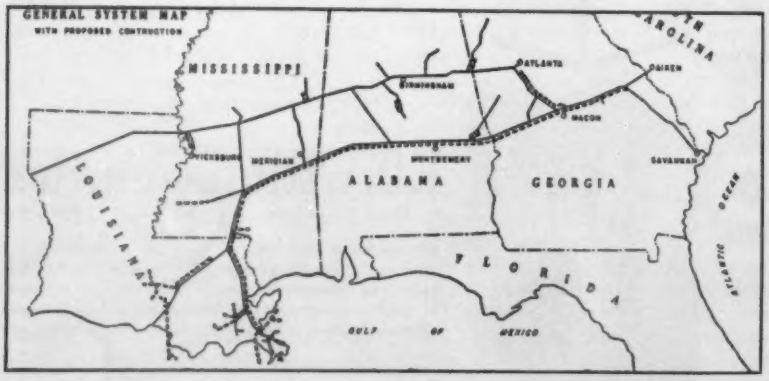
The largest single expansion in the history of Southern Natural Gas Co., Birmingham, Ala., involves boosting the company's system by more than 300 MMcf/day.

The company's most recent FPC application (Docket G-14587) seeks an okay to spend an estimated $64.5 million to serve new and existing customers and to build facilities to take gas from seven additional fields.

C. T. Chenery, board chairman, said that this plan, together with expenditures pending under other applications (Dockets G-13082, G-13203, G-13379, G-13864, and G-14560), would involve a total of approximately $110 million.

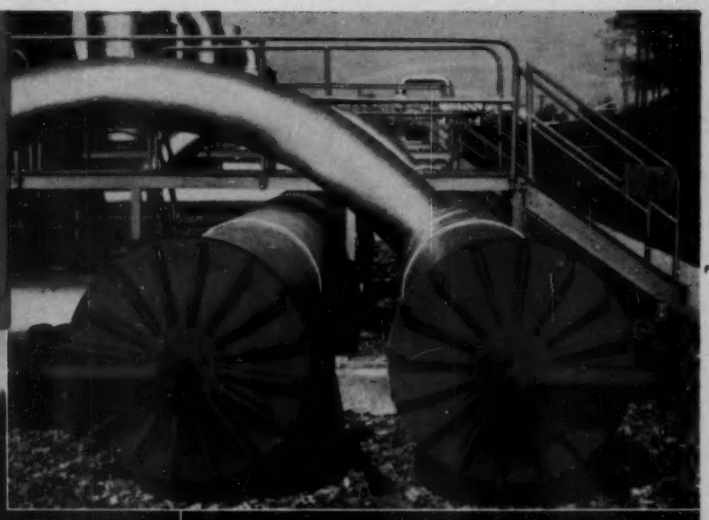
The Memphis decision is the dark cloud hovering over the entire plan. Mr. Chenery stated that Southern Natural would find it difficult, if not impossible, to raise the money required for the construction program unless the decision is reversed by the Supreme Court. Or, unless the company is able to work out a satisfactory settlement with its customers of presently pending rate proceedings. According to the application filed with the FPC, Southern Natural is trying to negotiate rate agreements with its resale customers which will meet the requirements of the Memphis decision.

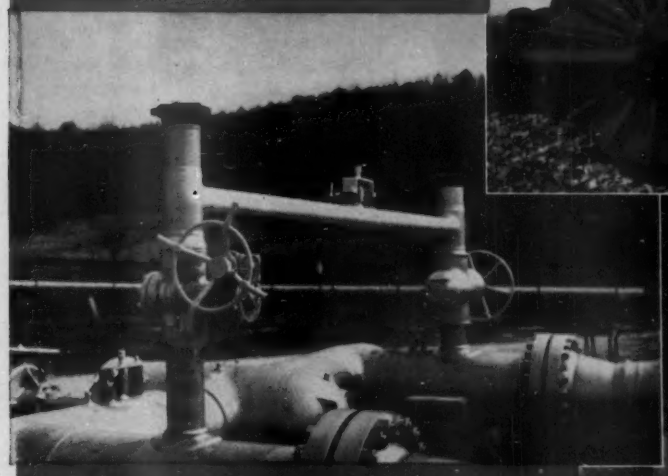
The entire program foresees the installation of about 1200 miles of pipe to gather gas from about 35 new fields located in south Louisiana and the Gulf of Mexico. In addition to connecting the new gas fields, the new lines would parallel existing lines along the Louisiana supply system and from Gwinville, Miss., to Wrens, Ga. The overall program also provides for the addition of nearly 16,000 hp to existing compressor stations and for a parallel line between Macon and Atlanta, Ga. The expanded system will be able to supply the needs of Georgia Coastal Natural Gas Corp.,




The broken line shows Southern Natural's major expansion which will increase its system capacity by more than 300 MMcf/day.

# On scraper trap, strainer or blow-down





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**A USER'S REPORT ON MALONEY SCRAPER CUPS . . .**

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## pipeline news • *Cont'd.*

a new company recently certificated by the Georgia PSC. This new line proposes service to an area in southeast Georgia, including the cities of Waycross and Brunswick, and 20 other communities.

### FPC turns down Northern's $86 million application

The FPC rejected Northern Natural Gas Co.'s plan to spend $86 million to expand its system.

In Docket G-14218, Northern sought to supply additional contract demand of presently served communities. It also covered second-year contract demand for the 1959-1960 heating season for 208 communities which would get gas under Northern's pending Docket G-12241, as well as first and second year requirements of an additional 177 communities in Minnesota, Wisconsin, the Dakotas, Iowa, Nebraska and Illinois not presently served.

The commission told Northern that its filing in G-14218, as well as the companion application of Permian Basin Pipeline Co. (Docket G-14219), "is contrary to the express provisions of ordering Paragraphs (D), (E), and (F) of the commission's order" issued in the American Louisiana Pipe Line case (Docket G-2306, et al).

The FPC also said that "both of the . . . applications indicate that it will be necessary for El Paso Natural Gas Co. to file and receive authority for the transportation of natural gas for the account of Northern . . . Such interdependent application has not been filed as required by . . . the commission's regulations."

### Just and reasonable rate increase not allowed

Although a rate increase proposed by an interstate natural gas pipeline company may be just and reasonable, it must be disallowed because of the Memphis decision. This ruling was made by an FPC presiding examiner when he turned down Michigan Wisconsin Pipe Line Co.'s proposed $4 million rate hike.

Under the recent ruling, the commission can't approve rate increases unless they are accompanied by a negotiated agreement between the supplier and its customers.

# HALLEN TIE-IN CREW

**on relocation of Tennessee Gas Transmission Company line in Westchester County, White Plains, New York**

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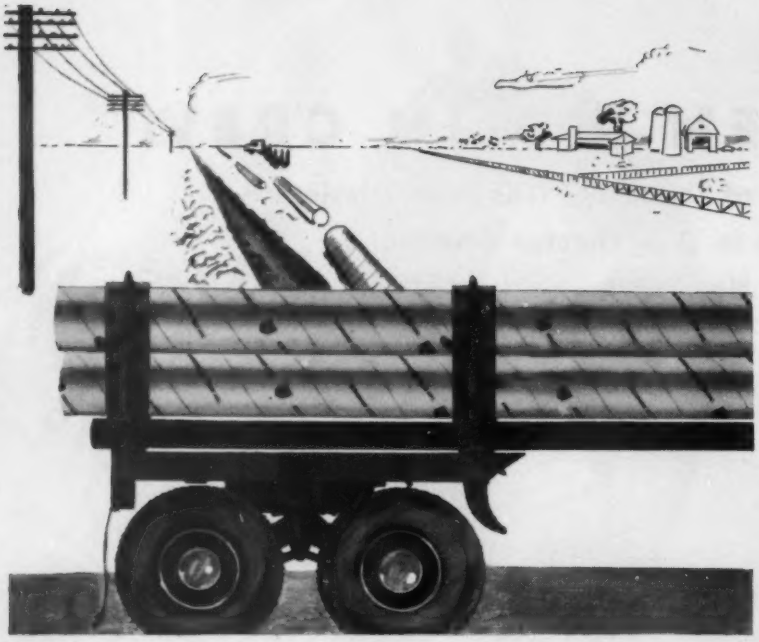

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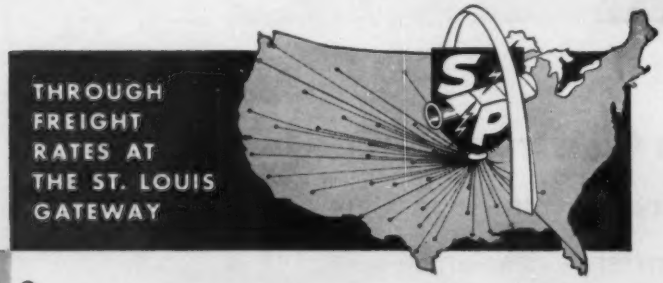


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## pipeline news • *Cont'd.*

After making a detailed analysis of the various issues involved in the proceeding, the presiding examiner concluded that the company's proposed increase had been shown to be justified and that "but for countervailing legal considerations, it would not be in the public interest to further defer approval of said rate."

### Examiner okays United's Louisiana purchase

Once again an FPC presiding examiner has bypassed an FPC staff recommendation for lower rates (see *GAS*, February, page 140), and given the green-light to a 21.3 cent/Mcf rate.

This case also involves United Gas Pipe Line Co., Shreveport. In Docket G-12121, United asked for a certificate to construct and operate necessary facilities to enable it to buy gas from the Bayou Rambio field, Terrebonne Parish, La. The presiding examiner approved these facilities as well as the sale of gas to United by Superior Oil Co., Texas Gulf Producing Co., and Olin Gas Transmission Co., at an initial rate of 21.3 cents/Mcf.

The FPC staff recommendation was for not in excess of 18 cents. The examiner said it was clear from the evidence that the price was agreed upon as a result of arm's length bargaining, that competition for the purchase existed, and that the proposed initial rate is higher than any price being charged in south Louisiana which is not the subject of FPC proceedings.

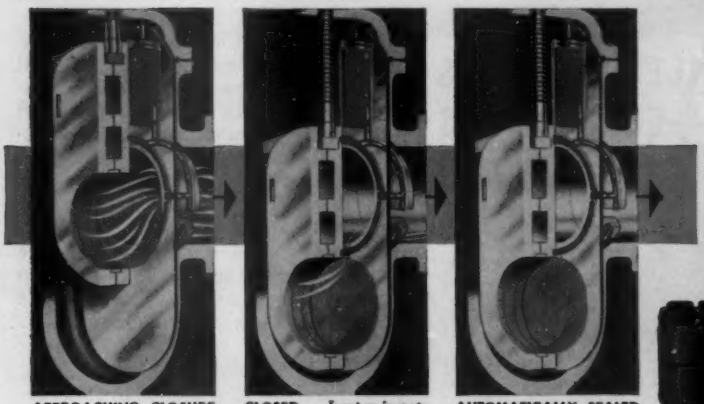
"On the other hand," he said, "there is no evidence at all that the excess of the price so agreed upon between United and the sellers over those paid by others in the area is such that it will adversely affect in any way the economic feasibility of the proposed project or United's existing rates to any of its customers."

### Court reverses FPC in NGPL rate appeal

A U. S. Court of Appeals has reversed an FPC ruling and, in effect, reduced the rates Natural Gas Pipeline Co. of America has paid to buy gas from Dorchester Corp., an Oklahoma producer.

*For pipeliners who hate leaks!*

# DARLING-McEVOY SELF-SEALING CONDUIT VALVES



**APPROACHING CLOSURE** ... *No loss of sealant as sealing groove in seat is disconnected from reservoir until gate is fully closed.*

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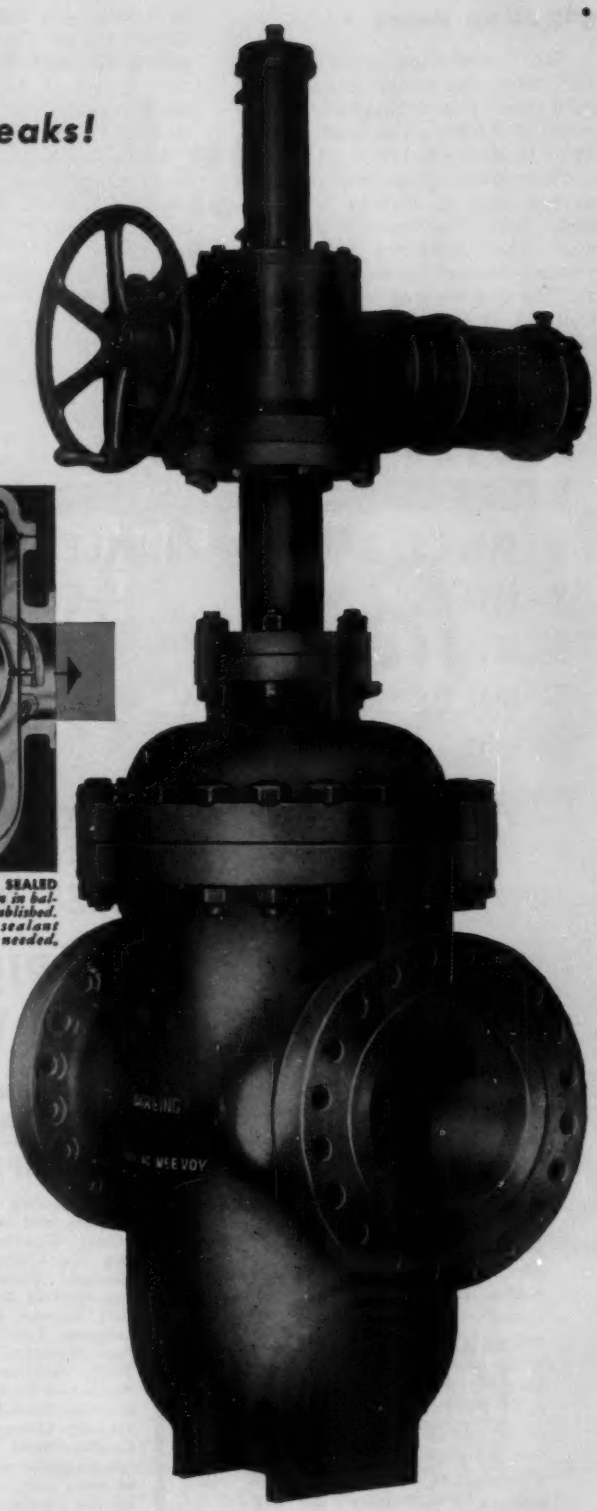

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## pipeline news • *Cont'd.*

NGPL, according to the ruling of the three-man court, should have paid Dorchester 6.253 cents/Mcf instead of 9.8262 cents from June 7, 1954, to March 1, 1955.

This lower price was the one agreed upon by Natural and Panoma Corp., Dorchester's predecessor. The Oklahoma Corporation Commission set the minimum price for the gas covered by the NGPL contract at 9.8262 cents. Natural, however, appealed this increase to both state and federal courts. Although the FPC recognized the 9.8-cent rate as the effective one, Natural's appeal of this was still pending before the U. S. Supreme Court when the FPC made this decision.

Later the FPC allowed Dorchester to raise the rate further—to 10 cents/Mcf. But the commission required a bond to cover the difference between the 9.8-cent and 10-cent rate. After consideration, the FPC dismissed the 10-cent rate.

The court in its recent opinion said NGPL was denied the chance by the FPC to argue the reinstatement of the 6.2-cent rate and referred to the whole matter as an "astonishing sequence of events."

"The shortcoming here has been that the commission made no attempt to find what was in the public interest," the unanimous opinion said.


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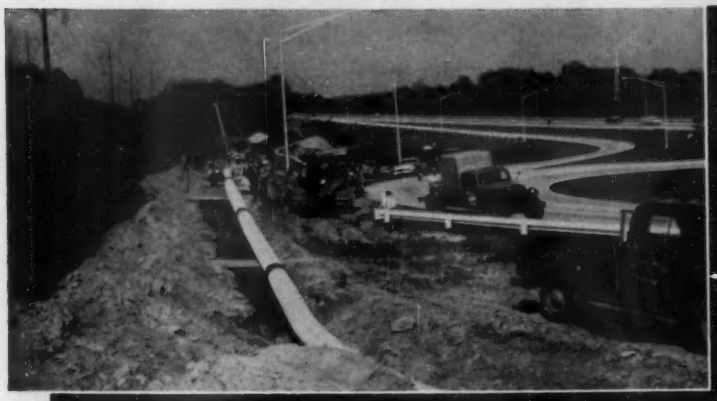

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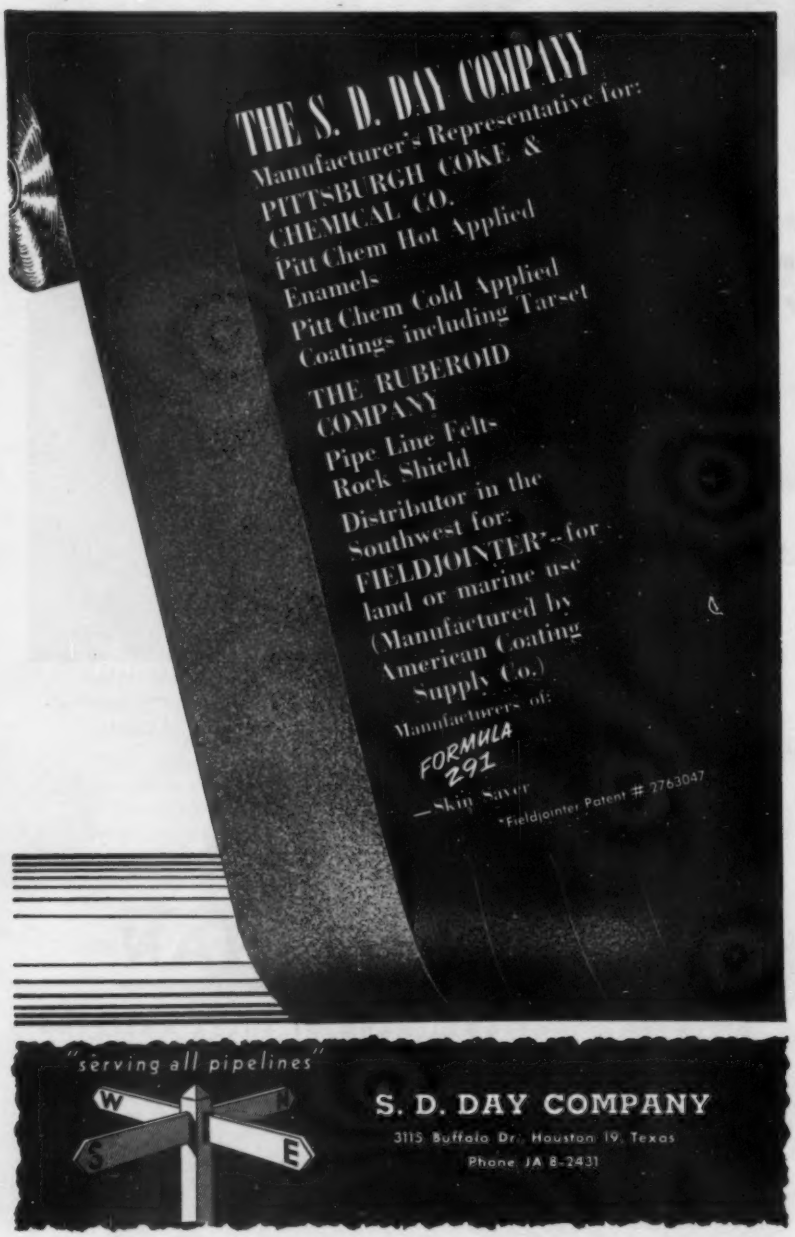
## pipeline news • *Cont'd.*

capacity of 50 MMcf/day in Pecos county, Texas; about 9 miles of various diameter field lines; and metering and communications facilities. Cost: $4 million.

*Granting Texas Eastern* Transmission Corp. temporary authorization for a 6600-hp compressor station near Blessing in Matagorda county, Texas (Docket G-14226). The new station, estimated to cost $2.3 million, will have six 1100-hp units. It will be located at the junction of Texas Eastern's existing 30-in. Vidor-McAllen and 24-in. Provident City-Blessing lines.

*Okaying United Gas* Pipe Line Co.'s plan to build about 203 miles of 30-in. line paralleling its existing line between New Orleans and Mobile. Estimated cost: $33.7 million. Louisiana gas will be brought into Southern's system to replace and supplement Mississippi supplies. An additional 308 MMcf/day is expected to be delivered from southeast Louisiana to the Mobile area.



## GAS Pipeline People

CLARENCE E. GOLDSMITH, a limited partner in White, Weld & Co., investment banking firm, has been elected a director of El Paso (Texas) Natural Gas Co.

FELIX J. MARTIN, formerly general superintendent of Mississippi River Fuel Corp.'s pipeline system, has been elected a vice president and director. LLOYD TRACHT, formerly vice president and treasurer of United Gas Corp., is Mississippi's financial officer and RICHARD W. HORNER, vice president, is now assistant to the president. J. G. WOODS was named general manager of the Mississippi River Chemical Co., a division.

MORRY T. WAKEFIELD has been appointed industrial relations director for Tube Turns, Louisville, Ky. He has been salary administrator since 1954. Tube Turns also has named ROBERT J. DILGER as director of purchases.

CLARENCE E. BECKER is now manager of manufacturing of the Buflovak Equipment Division of Blaw-Knox Co., Buffalo, N. Y. He has been with the company since 1936, most recently as manager of industrial engineering. The division also has named RAYMOND H. LEWIS as sales manager. He joined the company in 1935 as a sales engineer. Before his new assignment, Mr. Lewis was product manager for the division's line of evaporators, dryers and flakers.

FRED F. FLORENCE has been elected chairman of the board of Lone Star Steel Co., Dallas. Mr. Florence, chairman of the executive committee and chief executive officer of the Republic National Bank of Dallas, succeeds C. E. OWEN, who has resigned.

**Clarence Becker**
Blaw-Knox Co.

**Fred Florence**
Lone Star Steel

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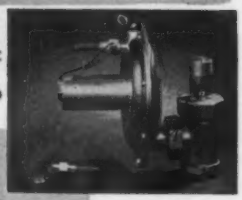

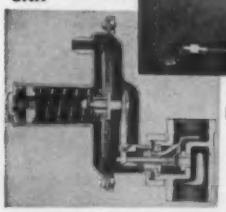

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## pipeline people • *Cont'd.*

General Electric Co.'s communication products department has appointed DAVID C. PINKERTON as its manager of advance engineering. He succeeds R. P. GIFFORD, who recently became manager of engineering.

WILLIAM H. MATZ has been promoted to supervisor, quality control for the chemical group of Pittsburgh (Pa.) Coke & Chemical Co.

A. L. STEGNER has been named technical administrative assistant to vice president J. J. King in the project development section of Tennessee Gas Transmission Co., Houston. LEONARD R. BROOKS was named chemical engineer in the section. Also promoted to managerial assignments in the oil and gas exploration department are GEORGE E. BURGHER, JR. and L. B. VADEN. Mr. Burgher, with TGT since 1954, is now manager of exploration properties. Mr. Vaden, who also joined the company in 1954, was named manager of exploration acquisitions.

Several promotions have been announced by United Gas Pipe Line Co. VERNON L. SCHARFE is now pipeline superintendent of the New Orleans district. He succeeds C. A. STEWART, who is retiring after holding the post for the past 13 years. M. H. CLEMENTS has been named pipeline superintendent of the Jackson, Miss. district. He succeeds EARL L. WAYNE, who recently became assistant district manager.

PHIL CLARKE has been named manager of hot roll steel products for the Lone Star Steel Co., Dallas. He joins Lone Star after eight years in steel sales with Youngstown Sheet & Tube Co.

NORMAN CAPLAN has joined Radio Corp. of America as manager, communications products department, telecommunications division, Camden, N. J. He formerly was manager of mobile products department at Bendix Aviation Corp. He succeeds C. M. LEWIS, who was recently named manager, marketing plans, RCA telecommunications division.

WILBUR S. ROBERTS, JR. has been appointed manager of the new business division of Stone & Webster Engineering Corp., New York.

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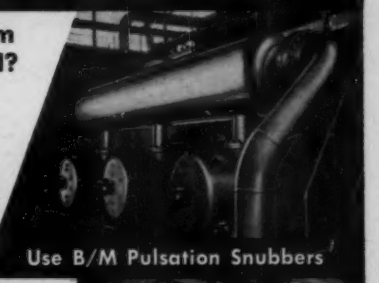

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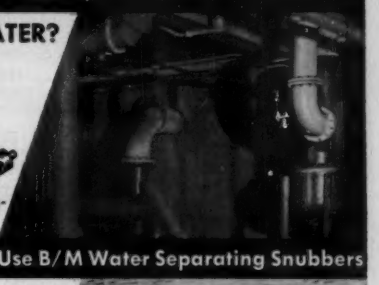

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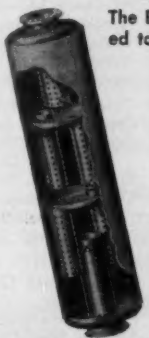

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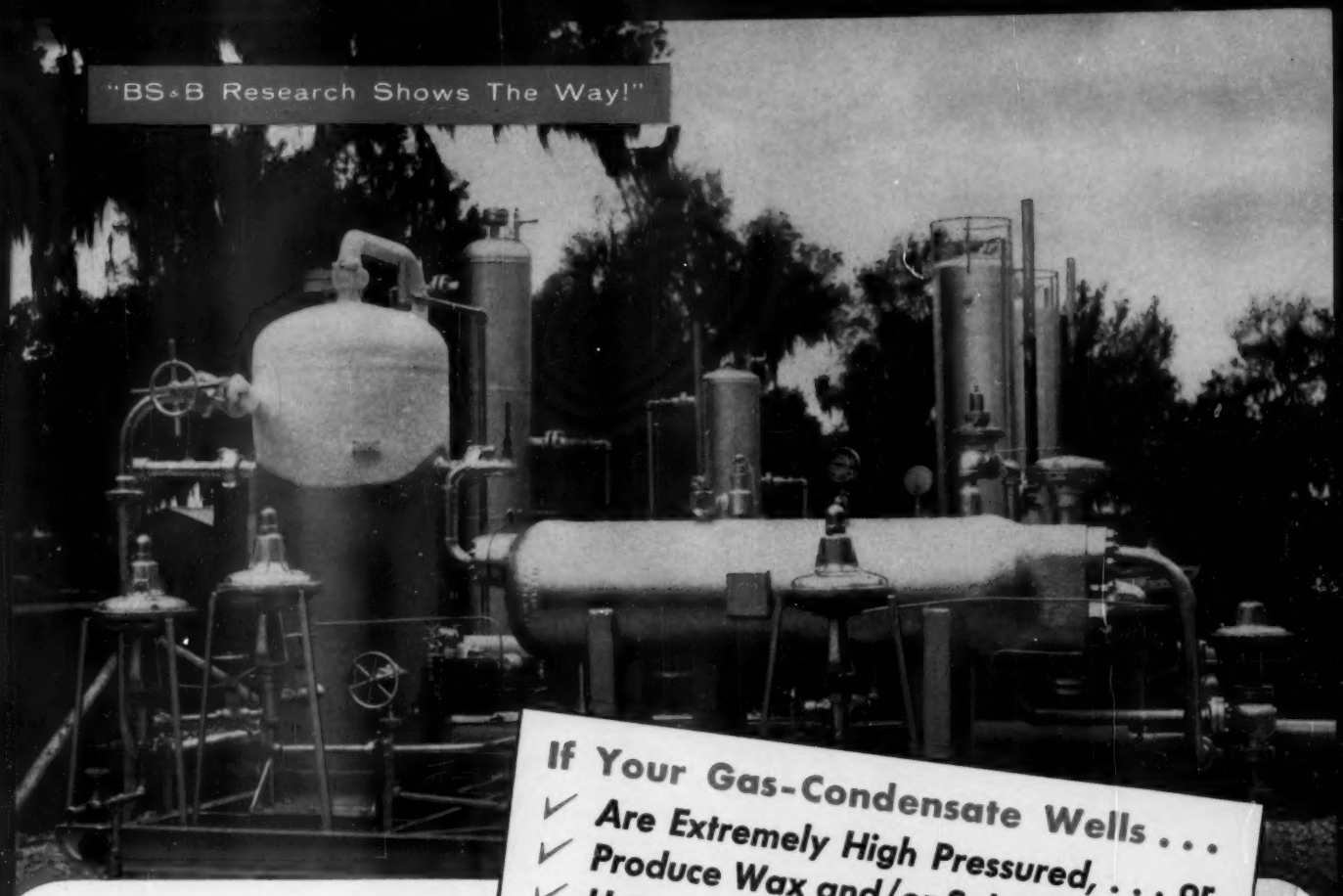


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- ✓ **Are Extremely High Pressured, . . . or**
- ✓ **Produce Wax and/or Salt Water, . . . or**
- ✓ **Have A Pressure Life of 3 to 5 Years . . .**

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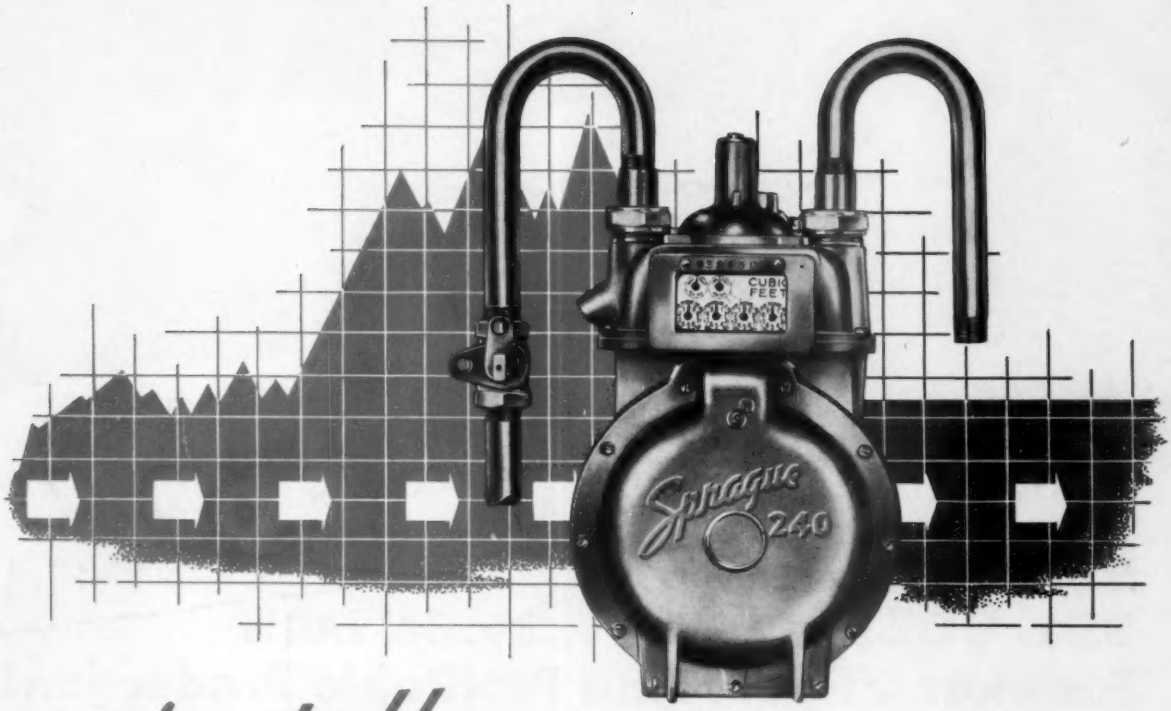


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